9725
.C52
v.1

41453

Albion College
Library

ALBION COLLEGE
LUX FIAT
ALBION MICH.

The Gift of
The

HD 41453
9725 Clark
.C52 History of manufactures
v.1 in the United States.

11 5 3

3 13 5

BERT B NOTESTEIN
9-05-4870

WITHDRAWN
FROM
ALBION COLLEGE LIBRARY

STOCKWELL-MUDD LIBRARIES
HD9725.C52
History of manufactures in the United St
3 5044 00316 7969

Date Due

Digitized by the Internet Archive
in 2022 with funding from
Kahle/Austin Foundation

https://archive.org/details/historyofmanufac0001vict

BOARD OF RESEARCH ASSOCIATES
IN
AMERICAN ECONOMIC HISTORY

HENRY W. FARNAM, *Chairman*

VICTOR S. CLARK
JOHN R. COMMONS
DAVIS R. DEWEY
HENRY B. GARDNER
EMORY R. JOHNSON
EDWARD W. PARKER
HENRY C. TAYLOR

History of Manufactures in the United States

Volume I
1607-1860

BY
VICTOR S. CLARK

With an Introductory Note by
HENRY W. FARNAM

1929 EDITION

PUBLISHED FOR THE
CARNEGIE INSTITUTION OF WASHINGTON
BY THE
McGRAW-HILL BOOK COMPANY, INC.
NEW YORK: 370 SEVENTH AVENUE
LONDON: 6 & 8 BOUVERIE ST., E. C. 4
1929

Copyright, 1929, by the
Carnegie Institution of Washington

Printed in the United States of America

HD
9725
.C52
v.1

41453

INTRODUCTORY NOTE

The present volumes form part of a series of Contributions to the Economic History of the United States, begun under the Department of Economics and Sociology of the Carnegie Institution of Washington and continued by the Board of Research Associates in American Economic History. Other volumes of this series already issued are the *History of Domestic and Foreign Commerce*, by Prof. Emory R. Johnson and colleagues, published in 1915; the *History of Transportation to 1860*, prepared under the direction of Dr. Balthasar H. Meyer, in 1917; the *History of Labor*, by Prof. John R. Commons and collaborators, in 1918; and the *History of Northern Agriculture, 1620–1860*, by Dr. Percy Wells Bidwell and Dr. John I. Falconer, in 1925.

When the first volume of the *History of Manufactures* was published in 1916, it was hoped that the continuation of the work would soon follow, but when we entered the World War, Dr. Clark's services were drafted for the important work of following and reporting upon the press of the Central Powers. He was thus unable to give any time to other literary work, and his acceptance of the editorship of the *Living Age* after the conclusion of the War left him little time for the *History of Manufactures*. With rare persistence and industry he succeeded in completing, down to the present time, this study which is now offered to scholars.

The book is based on original material. It is an economic history in the strict sense of the word. It does not deal with technology and mechanics; it does not give biographies of prominent manufacturers; it cannot cover the details found in histories of specific industries. It does, however, give an interpretation in broad outlines of the development, the organization, and the economic interactions of manufacturing industry in our country from its feeble beginnings three centuries ago down to its truly remarkable expansion of recent years.

The mechanical inventions which made the end of the Eighteenth Century an era of industrial revolution have been supplemented and dwarfed by newer inventions and discoveries in technology, in chemistry, in electricity, in metallurgy, and in other sciences, while business organization has been perfected to utilize these innovations on a scale never before realized. The industrial revolution of the Eighteenth Century brought in with the factory system a great deal of poverty and distress among the workers. The new discoveries of the end of

the Nineteenth Century are now shared by the wage receivers generally to an extent which would have seemed Utopian half a century ago.

Since the World War, we have been entering upon a new era in which changed international relations are likely to play an important part. The shifting of the United States from the position of a debtor to that of a creditor nation is alone enough to mark the opening of a new chapter in world economics. That story, however, belongs to the historian of the future.

HENRY W. FARNAM.
Chairman

NEW HAVEN, CONN., *July 1928.*

PREFACE

These volumes comprise a revision of my *History of Manufactures in the United States 1607–1860*, published by the Carnegie Institution of Washington in 1916, which has been out of print for several years, a continuation of this history down to 1914, of which a small edition has just been issued by the Carnegie Institution exclusively to supply its library list, and additional chapters reviewing the principal facts of our manufacturing development from the beginning of the World War to the present time. Altogether the work embodies the fruit of researches begun in 1904 and continued, except for unavoidable interruptions, ever since. These researches have been conducted with the help of funds supplied by the Carnegie Institution, and more recently by the Board of Research Associates in American Economic History, which has carried forward the work of the Institution's Department of Economics and Sociology since its discontinuance in 1916.

Obviously, in dealing with a field as broad as that which these volumes profess to explore, it has not been possible to tarry over the minutiæ of our industrial annals. Some branches of manufacturing which, taken by themselves, are well worthy of the historian's attention remain unmentioned. During the later period especially, our manufactures have attained such dimensions that the only clue through their labyrinth is afforded by the evolution of a few major industries.

Since no previous explorer has attempted to traverse this territory as a whole, the present volume will inevitably reveal some of the defects of a pioneer work. Even histories of particular branches of manufacture are rare, and only occasionally is it possible to appeal to the generalizations and the matured judgments of a specialist in any one of them to illustrate or emphasize the laws that have governed our broader industrial growth. Although the footnotes are numerous, since they are designed to guide subsequent investigators to the sources consulted, it has been impossible to include in them references to more than a part of the authorities used.

An apology is due to readers, meticulous in respect to definitions, for employing the word *trust* in its popular and colloquial meaning. The author's only defense is that no other word seemed to serve his purpose equally well.

VICTOR S. CLARK

July 1928

CONTENTS

CHAPTER I

PAGE

European Background to Colonial Manufactures—Influence of Natural Resources and Markets 1

Purpose and method, 1. Colonial period, 1. Influence of England's industrial development upon colonial manufactures, 3. Influence of natural resources and markets upon colonial manufactures, 8.

CHAPTER II

British Policy and Colonial Manufactures 9

England's motives for founding colonies, 9. British supervisory authorities, 12. Colonial policies, 14. Navigation acts in relation to colonial manufactures, 16. Influence of British customs laws upon colonial manufactures, 19. Laws relating to manufactures, 22. Disallowance of colonial laws by the British government, 26. British administrative policy and colonial manufactures, 27. Equity and results of British policy towards colonial manufactures, 28.

CHAPTER III

Colonial Legislation Affecting Manufactures 31

Compulsory manufactures, 31. Public industries, 32. Bounties, premiums, and subsidies on raw materials and manufactures, 33. Land grants, loans, and lotteries in aid of manufactures, 39. Legal-tender and tax laws, 44. Monopolies and patents, 47. Export regulations and tariffs, 53. Import duties and tonnage laws, 56. Regulation of mills and other industrial establishments, 63. Regulations to assure the quality of manufactured commodities, 64. Miscellaneous laws affecting manufactures, 67. Inferences and conclusion, 70.

CHAPTER IV

Influence of Natural Resources upon Colonial Manufactures 73

Forest resources, 73. Minerals, 75. Relation of agriculture to manufactures, 76. Fur and wool, 77. Flax and hemp, 82. Cotton, 83. Fisheries, 85.

CHAPTER V

Influence of Transportation and Markets upon Colonial Manufactures 87

Transportation as conditioning markets, 87. Transportation of raw materials, 91. Manufactures classified by markets, 92. The transatlantic market, 94. The island market, 98. The Indian trade and the fleet trade, 100. Manufactures for the home market, 100. Expansion due to growth of population, 101. Expansion of the home market due to development, 106. Articles consumed in the colonies, 108. Intercolonial trade in domestic manufactures, 112. Relative consumption of foreign and domestic manufactures, 118.

CHAPTER VI

Currency and Prices 123

Prices and manufactures, 123. Scarce and unstable currency, 123. Business crises, 129. Influence of war upon colonial manufactures, 132. Prices of primary manufactures in the colonies, 135. Prices of textiles and clothing, 140.

CHAPTER VII PAGE

The Relation of Capital and Labor to the Progress of Colonial Manufactures 144

Distribution and investment of capital, 144. Profits and interest, 147. Manufacturing capital, 151. Scarcity of labor, 152. Comparative wages in America and Europe, 155.

CHAPTER VIII

Technology and Organization of Colonial Manufactures 159

Plant and processes of household manufactures, 159. Workshop crafts, 161. Mill and furnace industries, 164. Industrial organization, 181. Manufacturing companies and associations, 182. Beginning of industrial towns, 185. Origin of the factory system in America, 188.

CHAPTER IX

Review of Contemporary Accounts of Colonial Manufactures 194

Sources of information, 194. Manufactures before 1721, 195. Report of 1721, 200. Report of 1733, 202. Manufactures during the later colonial wars, 205. Manufactures at the close of the colonial wars, 207.

CHAPTER X

The Political Propaganda of Home Industry and Manufactures during the Revolution 215

Period of non-importation, 215. Manufactures of the Revolution, 219. Manufactures of the Confederation, 227.

CHAPTER XI

Foreign Influences Affecting American Manufactures after 1790 233

European background to American manufactures; periods of manufacturing development before 1860, 233. Foreign commerce and domestic manufactures, 236. Foreign competition and American manufactures, 239. Influence of foreign legislation and commercial policies upon our manufactures, 254. Foreign technical progress and American industry, 260.

CHAPTER XII

Domestic Policies and Legislation Affecting Manufactures 263

State and local legislation, 263. Influence of Federal policies and legislation upon American manufactures, 268. Tariff laws from 1789 to 1816, 270. Tariff laws from 1816 to 1833, 274. Tariff laws from 1833 to 1860, 279. General influence of a protective policy on manufactures, 283. Duties on raw materials, 287. Specific and ad valorem duties, 306. Influence of the tariff on market stability, 308. Patent legislation, 312.

CHAPTER XIII

Raw Materials and Manufactures, 1790-1860 315

Forest resources, 315. Manufactures based on agricultural products, 317. Mineral resources and manufactures, 328. Chemicals and dyes, 333.

CHAPTER XIV

The Relation of Transportation and Markets to Manufactures 335

General conditions controlling inland transportation before 1860, 335. Overland freighting and manufactures, 336. Distribution of raw materials and manufactured products by waterways, 338. Influence of canals and steamboats upon manufactures, 347. Railways and manufactures, 351. Growth and organization of the domestic market, 354. Foreign markets and American manufactures, 360.

CHAPTER XV PAGE

Capital, Profits, and Wages in Manufactures 364

Early commercial conditions affecting manufactures, 364. Sources of industrial capital, 367. Manufacturing profits, 372. Commercial crises, 378. Cost of production and prices, 385. Wages in America and England, 389. Administration and supply of labor, 397.

CHAPTER XVI

Technical Progress of Manufactures, 1790–1860 402

The essence of technical progress, 402. Water and steam power, 403. Transmission and speed, 411. Primary metal manufactures, 412. Reproductive metal manufactures, 416. Wood-working machinery, 421. Textile machinery, 422. Conclusion, 435.

CHAPTER XVII

Organization of Manufactures, 1790–1860 438

Homespun manufactures, 438. Household and shop manufactures, 440. Mill and furnace industries, 445. The factory system, 448. Control and administration of industry, 455.

CHAPTER XVIII

Distribution and Volume of Manufactures 464

General distribution by localities, 464. Wood-using manufactures, 467. Agricultural implements, 476. Manufactures using farm products as raw materials; distilling, packing, tobacco, sugar, 479. Illuminants, 492.

CHAPTER XIX

Manufacture of Metals 496

Iron smelting and refining, 496. Foundry industries, 502. Engine and locomotive works, 505. Rolling mills, 510. Machine-shops, 515. Tools and hardware, 521. Copper and brass, 525. Jewelry and silverware, 527.

CHAPTER XX

Textiles 529

Flax, 529. Hemp, 532. Cotton, 533. Wool and Mixed cloths, 560. Silk, 575.

CHAPTER XXI

Review of the Pioneer Period 578

Index 583

PLATES

FACING PAGE

1. Canals and Railways 350
2. Iron works, 1622–1800 498
3. Iron Furnaces and Rolling Mills in 1859 504
4. Cotton Mills in 1810 536
5. Cotton Spindles in 1839 552
6. Woolen Mills in 1810 562
7. Sets of Woolen Machinery in 1845 572

CHAPTER I

EUROPEAN BACKGROUND TO COLONIAL MANUFACTURES—INFLUENCE OF NATURAL RESOURCES AND MARKETS

Purpose and method, 1. Colonial period, 1. Influence of England's industrial development upon colonial manufactures, 3. Influence of natural resources and markets upon colonial manufactures, 8.

PURPOSE AND METHOD

A narrative and chronological account of American manufactures lies within the province of the historian rather than of the economist. The purpose of the latter is not solely to present a picture of the past, but to interpret selected historical data as illustrating phases of economic progress. To this end the topical method has been here adopted. No attempt has been made to record the minutiæ of manufacturing annals, to fix the exact dates when unimportant factories were established, to describe technical processes and patents, or to enter into other details likely to confuse the purport of essential facts in their relation to general economic movements. The purpose has been to cull what is really significant from the mass of materials at hand, and so to arrange it as to show most clearly the forces that have shaped the development of American manufactures.

Our industrial system is not indigenous. Like our people, it has been transplanted from other lands. Foreign as well as local influences have affected every stage of its development, not only during the years of colonial dependence, but constantly since we became a self-governing people. Manufactures have been affected, too, by political events, government policies, and domestic influences not belonging strictly to the economic life of the nation. Therefore it has frequently been necessary to allude to facts outside of manufactures proper—to refer to the general environment, both national and international, that has conditioned industrial progress at different periods.

COLONIAL PERIOD

So long as the British settlements in America were dependent on England, they were not fully free to shape their economic policies. However, the colonial period is not as exactly divided in industrial as in political history. Our manufacturing dependence upon Great Britain was protracted beyond the period of her political control, but our struggle to free ourselves from this economic dependence preceded

the military events that separated us from the mother country. Whatever the result of that war might have been, and whatever policy might have been adopted by England toward her American colonies in the decades closing with 1776, the development of our resources would have kept pace with the expansion of our markets at home and abroad, and our industries would have multiplied, assuring us eventual economic self-direction. Economic forces underlie political changes and are not to be interpreted by them. Nevertheless the colonial period is a convenient division in the history of our manufactures, although it is justified by external events rather than by intimate and necessary relations.

The colonial period does not stand for a time when industrial conditions in America were uniform. It might be divided into an indefinite number of shorter periods, each embracing quite different conditions from the others. During the 170 years of colonial settlement occurred all the change from the trading station, the fishing settlement, and the frontier post to the conservative seaboard town of old traditions and the thriving countryside already distressed with a surplus population. Chalmers, writing from the point of view of an Englishman, divides colonial history into two periods: from the early settlements until the Revolution of 1688, when Great Britain became conscious of her grander destiny in America and her transatlantic rivalry with France began, and from the latter date until the time in which he wrote.[1] Roughly, this is a division that helps to illuminate the history of colonial manufactures. The founding of Philadelphia, in 1682, marks the close of the pioneer period of American settlement. Though Georgia was founded later, it was industrially but an expansion of the Carolinas. By 1688 a British colonial policy had been adopted and trade and commerce were regulated. The natural resources of the Atlantic slope were explored. The gap between New England and Virginia had been closed by the occupation of New Amsterdam and England's Dutch rivals had been ousted from that vantage-point of colonial trade. Already settlements were nearly continuous from the Kennebec to Charleston. Penn's companions found as many white settlers in the valley of the Delaware as Smith and the early Virginia colonists found Indians in the valley of the James. The courses of the Atlantic were well known. Communication was frequent and immigration systematically promoted. The Quaker colonists were able soon to surround themselves with many of the comforts and refinements of England. Their settlement in Pennsylvania resembled the opening of a new tract of western country at the present day, so rapidly were homes and towns built; and an economically complex community at once arose. The amount of mobile capital in England had increased vastly since 1606 and supplied the means for this

[1] Chalmers, *Political Annals of the Present United Colonies*, Preface.

rapid development. Estates in America were becoming, in the popular mind, a continuous portion of the national domain of Great Britain. The routes of colonial trade were established and markets for the country's resources were discovered. Hitherto colonists had been pioneers; thereafter they were immigrants and settlers. Within a few decades, Long Island was so well populated that young men seeking farms were obliged to migrate.[2] Before the close of the colonial period, Connecticut had a larger population than it was able to support as an exclusively agricultural and commercial state.[3]

During this second period national consciousness and a spirit of cooperation, as necessary in industry as in war and government, were aroused by the collective effort to dislodge the French from the northern and western borders. Already the possibilities of future expansion were seen in the fertile valleys of the central continent. A stage of economic development was reached when foreign supplies could no longer satisfy the domestic demand for manufactures, and in view of greater destinies industrial dependence was felt to be as unworthy as it was seen to be temporary. As colonies the British possessions in America had reached maturity. This transition from pioneer conditions to those of an established community is reflected in every detail of their economic history. No corresponding change in material, political, and social surroundings accompanied the growth of manufactures in any European country.

INFLUENCE OF ENGLAND'S INDUSTRIAL DEVELOPMENT UPON COLONIAL MANUFACTURES

Meantime there was an intimate relation between industrial conditions in England and those in the colonies. The settlement of Englishmen in America was itself a result of the commercial expansion and the increase of capital in England during the sixteenth century. Those one hundred years had seen the Kingdom of the Tudors grow from a country predominantly agricultural and commercially dependent upon Italy, the Hanse towns, and the Lowlands, receiving all of its finer manufactures from abroad, with little foreign shipping and over-sea trade, to a country whose naval supremacy was acknowledged and whose merchant fleet rivaled that of older commercial nations.

This newly achieved foreign trade differed from guild manufactures in being organized on a capitalist basis, but is resembled the latter in its dependence upon corporate privilege and monopolies. The commercial companies originated from temporary associations of merchants who united their capital to freight a ship for a distant voyage. The

[2] Lord Cornbury to the Board of Trade, July 1, 1708, in O'Callaghan, *Documents Relative to the Colonial History of New York*, v, 56.

[3] Coxe, *Observations on the Agriculture, Manufactures and Commerce of the United States*, 19; *cf.* also Hindsale, *The Old North West*, 111.

reign of Elizabeth saw these transient organizations develop into permanent companies. In 1554 the Muscovy Company was founded, in 1579 the Baltic Company, in 1581 the Turkey Company, and in 1600 the East India Company, which was destined to have an imperial career and to influence not only the economic but also the political history of Great Britain. The Virginia and Plymouth companies were merchant associations, modified for the purpose of occupying undeveloped territory and settling it with British subjects. We shall see that their objects included establishing manufactures in America.

As the free artisans of England revolted from the monopoly and privileges of the guilds, so the individual enterprise of Great Britain resented the commercial monopolies of the merchant companies. An interloper trade grew up in defiance of the laws that gave these corporations the exclusive right to traffic in certain countries, a precedent later for the colonial evasion of the navigations acts. Sir Josiah Child, president of the East India Company, expressed the sentiment of the privileged merchants when he wrote:

> "New England] is the most prejudicial plantation to this Kingdom. Of all the American plantations, his Majesty has none so apt for the building of shipping—and, in my poor opinion, there is nothing more prejudicial, and, in prospect, more dangerous to any mother kingdom, than the increase of shipping in her Colonies."[4]

The free commerce of the American settlements was but another phase of the revolt against commercial restraint which his company was encountering in England itself; and more silently, with fewer dramatic episodes, a revolt against industrial restraints, actuated by the same spirit under similar conditions, was beginning both in the mother country and in America.

The capitalist organization of manufactures grew out of the capitalist organization of commerce, and was the outcome of a broader market rather than of the introduction of machinery.[5] A craftsman might own his tools and purchase his raw materials, but he could not, while plying his trade, transport his manufactures to a distant market or hold them for a protracted period before finding a purchaser. These processes of exchange were a function of capital. The expansion of commerce in Great Britain, therefore, hastened the reorganization of manufactures by favoring a class of merchant employers who, to supply evenly the permanent demands of their distant markets, intervened more and more directly in manufacturing operations. As manufactures became more complex and depended to a greater extent upon raw materials imported from abroad, the industrial activities of the merchant employer grew still more important.

[4] Child, *A New Discourse on Trade*, 198, 201; but *cf. id.*, 97, § 4; also Cunningham, *Growth of English Industry, Modern Times*, I, 264, 265.

[5] *Cf.* Cunningham, *Growth of English Industry, Modern Times*, I, 496–498.

At the beginning of the colonial period Great Britain was a manufacturing nation of secondary importance.[6] Wool, for centuries the staple product of the Kingdom, was largely woven abroad, and England, while producing the materials from which they were made, depended almost entirely upon foreign manufacturers for finer fabrics. Under Elizabeth the government began systematically to foster new industries by granting patents, monopolies, and special privileges to capitalists introducing them.[7] During this and the following century large numbers of skilled artisans from Europe found England a profitable field for plying their trades. In Elizabeth's time a settlement of Lowlanders greatly stimulated the British woolen industry; window glass was apparently first made in England during the same reign, as a monopoly of this manufacture was granted to foreigners in 1567.[8] Among the industries which Elizabeth aimed to introduce were the manufacture of alum, soap, oils, salt, saltpeter, and sheet-metal, all of which had previously been imported.[9] During the closing years of the sixteenth century the manufacture of paper, thread, silk, and pottery was established. It was not until the latter century that cotton manufactures, previously flourishing at Antwerp, began to attract attention at Manchester. The industry was probably established by refugees from the former city. About the same time metal-working, especially in brass, was brought to a higher state of perfection than hitherto by foreign artisans at Birmingham.[9]

Although the industries of England were not so developed as those of Europe, the organization of industry had undergone great changes since the medieval period, and new systems of industrial legislation had been introduced. The craft guilds, once so important in both the political and the industrial life of the municipalities, had been so far supplanted that the earliest colonists brought with them from the mother country but weak traditions of these societies, and such organizations were rarely established in America.[10] They belonged to an earlier stage of civic development, and were municipal bodies that had no reason for existence in a country where cities were so subordinate as in the early colonial settlements; and they preceded the rise of capitalism, which we have seen was already a distinct factor in manufacturing when the colonies were established. Certain functions of the guilds persisted in England as two phases of national regulation of industry. They had maintained the standards of workmanship and commodities. The royal government, when it began directly to interfere with industrial administration in the reigns of James I and Charles I, transferred these powers either to some individual,

[6] Cunningham, *Growth of English Industry, Modern Times*, I, 58.
[7] Hulme, "History of the Patent System," in *Law-Quarterly Review*, XII, 141; XVI, 44.
[8] Hulme, "English Glass Making in the 16th and 17th Centuries," in *Antiquary*, XXX, 210.
[9] Cunningham, *Growth of English Industry, Modern Times*, I, 78; *cf. id.*, 83–84.
[10] Gibbins, *Industry in England*, 247.

whose duty it was to inspect goods and enforce standards of workmanship, or to companies of master-craftsmen or capitalist-employers established for the same purpose.[11] During these and the succeeding reigns these city companies, quite distinct from the medieval guilds, played an important part in English industrial history and one not unfamiliar to colonial artisans; but in America such companies were seldom established and never exercised jurisdiction of sufficient importance to make them more than a passing incident in the history of our manufactures. That they did not thrive in the colonies was due to the relatively greater dispersion of industry, the union of several branches of manufacture in the same workshop, the difficulty of enforcing apprentice regulations in a land where there was so exigent a demand for skilled labor, and doubtless also the indisposition of people accustomed to little political restraint in business matters to subject themselves to this kind of supervision.

In England, from the time of Elizabeth, city artificers, in order to avoid apprentice regulations and other restrictions imposed by the city companies, had established themselves outside the jurisdiction of the latter, in suburbs and country places, and thus countryside industries had grown up.[12] The need of regulating these manufactures, and the growing disposition of the government to exercise authority directly in industrial matters, gave increased importance to supervision by inspectors appointed by Parliament or by the King. Such officials had existed for certain trades from early times, but their number and power were enlarged with the growth of England's trade in manufactures. The precedent of thus designating officers to inspect goods and mark them with a public seal was generally adopted in the colonies. In America the object was the same as that of the government in Great Britain, to protect domestic consumers from imposition and to promote commerce by guaranteeing the wares exported.

Apprenticeship was almost as familiar an institution in the colonies as in England. However, in America the motive for apprentice laws was not the same as in the mother country. In England they were part of the ancient system for maintaining craft traditions and monopolies. In America the great need of labor, and the consequent value of even youthful labor, together with the fact that the early industries either demanded little skill or were carried on by immigrants trained abroad, lessened the educative influence of this institution and made it hardly more than a regulation of certain labor contracts. In some colonies its most common application was to orphans and other dependent children, who were bound out to service in order to relieve the community of the burden of their support.[13]

[11] Cunningham, *Growth of English Industry, Modern Times*, I, 205, 298, 312 (note), 321.
[12] Cunningham, *Growth of English History, Modern Times*, I, 26; *cf. id.*, 308, 309.
[13] Franklin, "Information to Those Who Would Remove to America," in *Works*, VIII, 612.

The growth of industries in the colonies does not present all the typical phases that it presented in Europe. Nevertheless the total experience of European industry is embodied in the industrial history of America. Some writers make the first stage of manufacturing development the homespun period, when manufactures are confined to the family producing for its own consumption; the second stage when the household begins to produce a surplus for sale to outside consumers; third, the guild period, when qualified masters or associations of workmen sell their wares directly to the public; fourth, the period of domestic or household production for merchant manufacturers, when workmen follow special crafts, but sell their wares to dealers instead of directly to consumers; and last, that of the factory system.[14] It is doubtful if one of these stages, in any country that has passed beyond primitive civilization, ever has prevailed so as to exclude entirely some of the others. All of these periods, except that of the guilds, were contemporary in the colonies. They did not represent separate steps of industrial evolution, because the concept of all the stages, except the factory period, was brought to America by the first settlers and constantly revived by the succeeding immigration of artisans. The factory system did not become important in Great Britain itself until toward the close of the colonial period, and even at that time there were incipient factory enterprises in Massachusetts, New York, and Pennsylvania.

Except so far as they were encouraged by the presence of raw materials not equally available in England, no manufactures in the colonies attained the degree of development which they had in the mother country. Subject to the same qualification, no industry arose in the colonies that was not already established in England at the time of its introduction in America. Still the organization of manufactures differed less in a settled country like England and an undeveloped country like the colonies than it would at the present time. Though the colonists were able to advance but slowly beyond the homespun stage of industrial evolution, especially in manufactures of a finer grade, nevertheless from a very early date these homespun industries were becoming commercial or domestic industries in some localities. At the same period homespun manufactures supplied a considerable share of British consumption. They persisted in Wales and the less-settled English counties until well into the last century, or almost as long as they did in America.

As affecting the reaction of British conditions upon American manufactures during the colonial period, it needs to be borne in mind also that the great inventions which have given England her industrial preeminence were not successfully applied to manufactures until about

[14] Held, *Zur Socialen Geschichte Englands*, 541. Ashley, *Early History of the English Woolen Industry*, 72–73.

the time of the American Revolution. Arkwright's machinery and Watt's steam-engine were patented in 1768 and 1769 respectively, but as their introduction was slow, they were not thoroughly established factors in the industrial life of England until after the colonies had attained their independence.

INFLUENCE OF NATURAL RESOURCES AND MARKETS UPON COLONIAL MANUFACTURES

Throughout this period we shall find two dominant influences controlling the development of manufactures in America: natural resources and markets. Forests, and later iron mines, supplied the raw materials from which crude manufactures for export were derived. As iron was reduced by charcoal, its production also depended ultimately upon the forests. Our early over-sea markets—the West Indies, the Wine Islands and South Europe, and England herself—called especially for the timber products of America. Tall trees supplied riven lumber in the form of staves and clapboards even before sawmills were erected or sawpits dug. Timber in exchange brought back from the tropics molasses, the raw material on which were founded New England's numerous distilleries. Following the timber trade came the demand for American flour and provisions, so that in the central colonies gristmills and bakehouses began to produce for export. For forest wealth in the form of pitch, tar, and other naval stores England afforded a ready market, and later she drew on the colonies for iron. The resulting commerce called for shipping, most cheaply built at home, and an industry was thus established that soon supplied vessels for export.

Upon the forests, then, depended in the first instance the export manufactures of America, and these in turn served as a regulator of all other manufactures in the central and New England colonies. Homespun industries throve or languished inversely to the activity of trade in cruder commodities. When foreign markets took freely the primary manufactures of the colonies, other industries declined. When wars, commercial restrictions, or stagnant trade closed to the colonists an over-sea outlet for these productions, they turned their attention to making at home the cloth, utensils, and other wares that in domestic markets took the place of the imported goods for which the people no longer could make returns.

CHAPTER II

BRITISH POLICY AND COLONIAL MANUFACTURES

England's motives for founding colonies, 9. British supervisory authorities, 12. Colonial policies, 14. Navigation acts in relation to colonial manufactures, 16. Influence of British customs laws upon colonial manufactures, 19. Laws relating to manufactures, 22. Disallowance of colonial laws by the British government, 26. British administrative policy and colonial manufactures, 27. Equity and results of British policy toward colonial manufactures, 28.

ENGLAND'S MOTIVES FOR FOUNDING COLONIES

The mercantile system governed the foreign-trade policy of Great Britain until the close of the eighteenth century. Its object was to produce at home what was consumed at home, and to increase exports but diminish imports, in order that the stock of coin within the country might be preserved and enlarged.[1] The commercial motives for founding and maintaining colonies in America fell within the general lines of this policy. These motives played an important part in the propaganda for settling over-sea possessions. The latter were expected to increase the economic strength of England in several ways:

In the first place they would render it independent of foreign supplies of naval stores.[2] Writers of the day dwelt upon the precarious dependence of England on the Baltic countries for masts, deals, pitch, tar, flax, hemp, and cordage, all of which were essential to the navy and likely to be cut off by war, embargo, or blockade precisely when they were most needed. People were told, with truth, that all of these supplies might be procured in abundance from America, were it settled with a population of English workers. This interest continued prominent in British policy and legislation throughout the colonial period.

In the second place, it was thought that America would produce luxuries then imported from the East, mostly in exchange for coin. England was spending large sums annually for wines, oranges, lemons, spices, salt, and silk from the Mediterranean and beyond, and in this trade foreign states were said, in the language of the day, "to draw from us all marrow of gain by their inquisitive inventions."[3] Over a

[1] *Cf.* "Instructions for the Councell of Trade," Great Britain, *State Papers, Domestic,* Charles II, XXI, 27, quoted in Cunningham, *Growth of English Industry, Modern Times,* II, 914, § 7.

[2] Smith, Captain John, "A Description of New England," in *Force, Tracts,* II, 1, p. 8. White, *The Planter's Plea,* in *Force, Tracts,* II, 3, p. 15.

[3] "A True Declaration of the Estate of the Colony in Virginia," in *Force, Tracts,* III, 1 pp. 22–23.

century later, when Georgia was founded, its promotors claimed that the silk raised in that colony would keep within the British dominions a million dollars a year then sent to Piedmont.[4] This general motive caused several experiments to be made in the colonies to produce the different commodities enumerated, but these were not attended with permanent success.

In the third place, the forests of the New World would supply fuel to support industries that were already denuding Great Britain of her timber.[5] Manufactures of iron and glass, and incidentally of potash, were here in mind. Even in Elizabeth's reign several laws were passed to check the operations of English forges and furnaces in districts where timber was scarce, and by a law of 1681 the iron-makers of Sussex had been forced to discontinue working. Early writers, from John Smith onward, noted the abundance of iron ore and fuel in America as an argument in favor of making permanent settlements in this country.

A fourth consideration, closely associated with the desire to establish the fuel-using industries within the British dominions, but where they would not deplete the forest resources of England itself, was the desire to obtain independent supplies of raw material for other manufactures. The naval stores already mentioned, iron, potash, copper, oil, and later flax, hemp, and potter's clay, were among these commodities. This dependence of her manufacturing industries upon imported materials caused more concern as the growing trade of the country made these needs more numerous and more complex. Not long before the outbreak of the Revolution, an English author exclaimed that Britain was "a country of manufactures without materials, a trading post without commodities to trade upon, and a maritime power without either naval stores or materials for ship-building."[6]

Therefore while from the first the colonies were called plantations, plantation industries in a modern sense were not prominently in view when they were founded. Certainly the English Parliament, controlled by a landed aristocracy, had no intention of encouraging in America the production of crops that would compete with those grown at home. The importation of farm produce from America was taxed or prohibited. Agricultural exports from the colonies to Great Britain remained unimportant, if we except rice and tobacco, neither of which was a large item in English commerce before the settlement of Virginia. That province was colonized with commercial and manufacturing needs in view. The early broadsides published by the Virginia Company, calling for emigrants to their new settlement,

[4] "A Brief Account of the Establishment of the Colony of Georgia," in *Force, Tracts*, I, 2, p. 1.

[5] Johnson, *Nova Britannia*, in *Force, Tracts*, I, 6, p. 16. "A True Declaration of the Estate of the Colony in Virginia," in *Force, Tracts*, III, 1, p. 25.

[6] Mitchell, *Present State of Great Britain in North America*, 127.

solicited especially tradesmen and artisans, such as "blacksmiths, coopers, carpenters, shipwrights, turners, all who work any kind of metal, men who make bricks, architects, bakers, weavers, shoemakers, sawyers, and those who spin wool."[7] As some of the industries which it was proposed to establish in America were not carried on in England at that date, workmen were imported from Germany, Poland, and Italy for the colonies. These "workmen from foreign parts" set about the manufacture of pitch and tar, potash, and glass.[8] Some of these commodities, together with clapboards, were among the first returns that England received from her colonies in America.[9] At the same time a large capital, for the period, was invested in iron works. But these early experiments with manufactures of the cruder sort failed for the time being, partly because they were displaced by more profitable forms of agriculture. Nevertheless, in the light of the times, they were well advised and were a prophecy of industries later to become important.

The fifth motive for settling America was to afford a market for English manufactures.[10] During the first half of the seventeenth century England was especially concerned for her export trade in woolens. Competing manufactures were rising in Holland and France, and markets previously almost monopolized by British goods had been lost or were imperiled. Within a few years the number of pieces of white cloth annually sent out of the kingdom had fallen from 100,000 to 11,000; and Spain alone was taking 10,000 pieces less than formerly.[11] The advantage of an assured colonial market for woolens was therefore, from early times, a popular argument for promoting American settlements. But for the first half century at least, and even later, accounts of the colonies continue to vaunt the abundance of textile fibers and other materials for clothing that they produced.[12] In fact the full importance of the American market for English manufactures did not impress the popular mind in England until that market had been established.[13] It was not until after the Revolution of 1688, when the Whig industrialists attained power, that this great economic advantage to the mother country came clearly into view. Although the

[7] "Broadside of the Virginia Co.," in Brown, *Genesis of the United States*, I, 203; also *id.*, 353, 355–356, 445, 469.

[8] "New Britain," in Brown, *Genesis of the United States*, I, 268.

[9] Chamberlain to Carlton, Jan. 23, 1608, in Brown, *Genesis of the United States*, I, 205; Sir Thomas Dale to Sir Ralfe Winwood, June 3, 1616, *id.*, II, 783.

[10] "Reasons for Raising a Fund for the Support of a Colony at Virginia," in Brown, *Genesis of the United States*, I, 38–39. Johnson, *Nova Britannia*, in *Force, Tracts*, I, 6, p. 17. "A True Declaration of the Estate of the Colony in Virginia," in *Force, Tracts*, III, 1, p. 25.

[11] Great Britain, *Calendar State Papers, Domestic*, 1651, 270, June 26, 1651; 1651–1652, 88, Dec. 1651.

[12] Plantagenet, "A Description of the Province of New Albion," in *Force, Tracts*, II, 7, p. 31; Purry, "Description of South Carolina," in *Force, Tracts*, II, 11, p. 1; *cf.*, however, Johnson, *Nova Britannia*, in *Force, Tracts*, I, 6, p. 17.

[13] Cunningham, *Growth of English Industry, Modern Times*, I, 199, quoting *Life of Edward, Earl of Clarendon*, by Himself, III, 407.

navigation act of 1663 mentions the vent of English woolens and other commodities, there is no evidence that the conception of a colonial market was an important influence with Charles II and his statesmen.[14]

England's interest in an export market for her manufactures was much broader in the eighteenth than in the preceding century. During the earlier period the woolen industry was the sole great industry of national concern in relation to foreign trade; but later this trade expanded to include finer and more varied manufactures brought to her markets from foreign lands for shipment to her colonies and elsewhere, as well as a greater assortment of articles made in her own workshops. British textiles became more varied; linen and cotton were woven; the consumption of India goods had to be prohibited; and the manufacture of flax was thoroughly established in Ireland. Birmingham was a growing center of hardware manufacture. London was the home of hundreds of minor industries, supplying not only home but foreign demands. The influence of this changed condition was twofold: British immigrants were bringing with them to America a knowledge of a greater variety of arts than in the seventeenth century; but on the other hand, there was in England a far larger number of persons actively hostile to the manufacturing progress of the colonies than at the earlier period.

BRITISH SUPERVISORY AUTHORITIES

For the 82 years from the establishment of the first Virginia Company, in 1606, to the Revolution of 1688, the economic as well as the political supervision of the colonies was a matter of royal prerogative. The three charters of the Virginia Company, in 1606, 1609, and 1612, granted successively greater rights to the merchant promoters of the new settlement. The first charter provided for a resident council in Great Britain of 13 members, appointed and removed as the King should direct. The second charter established a true corporation. In 1625, shortly after the revocation of the last charter, Charles I issued a proclamation constituting two councils to have charge of the affairs of the colony, one of which was to reside in England. But the latter apparently exercised little control over colonial matters.

Meantime the Privy Council, as a body or through committees, was the regular organ for supervising the commerce and industries of the kingdom. This body attempted to control the trade of Virginia as early as 1621, when it ordered that goods from that colony should be unladen in England.[15] It also tried to prevent the Dutch trade

[14] Weeden, *Economic and Social History of New England*, I, 234. Cunningham, *Growth of English Industry, Modern Times*, I, 344.

[15] Great Britain, *Calendar of State Papers, America and West Indies*, 1574–1660, 26, Oct. 24, 1621.

with the English settlements from the beginning of this commerce in 1624.[16] In 1633 a report to the Privy Council from a body of commissioners to which it referred matters relating to colonial trade recommended the policy, already adopted by the administrative authorities, which was later prescribed by Parliament in the navigation acts.[17] In April, 1634, Charles I established a colonial commission "for the making laws and orders in forraigne parts," with superior jurisdiction over colonial rulers as well as over the people subject to their authority.[17] The Lords Commissioners for the Plantations, appointed by royal proclamation December 1, 1660, were modeled upon the permanent committee of trade, which had existed intermittently under Charles I and Cromwell, and was reëstablished by Charles II.[17] They included not only members of the Privy Council, but also experienced merchants, planters, and colonial administrators, that the Crown might have expert opinion on questions of economic as well as governmental policy in the colonies. These commissioners and the committee of trade were expected to work in harmony, and perhaps in conference, and their respective spheres of jurisdiction were not mutually exclusive. In 1672 a new board was appointed for the plantations, but it was dissolved by an order in council on March 12, 1675. Colonial affairs were thereafter in charge of a committee of the Privy Council until 1696.

From the Revolution of 1688, which began the long period of Whig ascendancy, a political and an economic principle, not new in English history but hitherto less important than later, gained ground with the government. The economic principle was protection for British commerce and manufactures, a policy similar to that adopted with apparently brilliant success by England's great rival, France; and coordinate with this was the effort of Parliament, partly in order to carry through this economic measure, to secure control of administrative departments of the government hitherto subject to royal authority. It already presided over the collection of customs, and was about to create another new department, for the purpose of maintaning the same supervision over commercial affairs that it had established over the revenues. But the King anticipated this action by himself appointing a permanent Board of Trade, superseding the Privy Council in this particular department of administration. The new body, of fifteen members, the full title of which was the Board of Trade and Plantations, included in its authority the right not only to supervise commerce with the colonies, but also to scrutinize acts of the colonial legislatures. Although by the navigation acts Parliament had previously extended its jurisdiction to cover colonial trade, even now it did

[16] Great Britain, *Calendar of State Papers, America and West Indies*, 1574–1660, 63, July, 1624.

[17] Great Britain, *Calendar of State Papers, America and West Indies*, 1574–1660, 165, Apr. 28, 1633; *cf. id.*, 177, Apr. 28, 1634; *cf. id.*, 492–493, Dec. 1, 1660.

not gain direct control of colonial administration in the manner projected. But from this time onwards, British authority in America was exercised ultimately by this branch of the government rather than by the King.[18]

The administration of parliamentary statutes in the colonies was primarily in the hands of the governors, who were directed also to enforce the regulations of the Board of Trade. The collectors of customs, appointed by the British treasurer, whose duties were indicated by their names, were expected to see that the navigation acts were observed. Occasionally special officers were appointed, such as Edward Randolph, who in 1675 was made "collector, surveyor and searcher" for all New England,[19] and Colonel Quarry, who was made surveyor-general in 1703. Together with other duties, these officers were intrusted with the protection of the royal forests in America. The authority of the governors varied in different provinces and was a matter of controversy with the local legislatures in all of them. In the proprietary colonies the control of the home government was exercised only lamely and indirectly. It was disputed and often defied in New England, and but grudingly assented to by Great Britain's most loyal subjects in America. Therefore the instructions of the Board of Trade to the governors were not enforced uniformly enough to make them a guide to the control really exercised over the colonists.

COLONIAL POLICIES

The colonial policy of Great Britain followed logically from the purpose of the government when the colonies were established, to make them subservient to the growth of English commerce and manufactures. This was not only the universal attitude toward colonization at that period, but it was part of a system of economic legislation and territorial privilege that from early times had permeated the entire industrial life of the country. Scarcely any act was employed or suggested to restrict or direct the commerce and manufactures of the colonies that had not been used in Great Britain itself to protect the privileges of certain localities or classes and to restrict the economic activities of other classes and localities. Certain British ports were denied the right to trade directly with foreign ports, as were the ports of the colonies; towns were privileged to manufacture certain articles which were not permitted to be manufactured for sale in other places, in the same way that it was sought to confine some manufactures to England and to prevent them in America.[20] During our colonial period Ireland and Scotland suffered disabilities similar to those im-

[18] For later history of colonial administration, see McCulloh, *Essay on Trade*, Dec. 10, 1756, in British Museum, *Additional Manuscripts*, 11514, *ff.* 73–82.

[19] Hutchinson, *Papers*, II, 260.

[20] Gibbins, *Industry in England*, 239.

posed on the North American settlements. The manufacture of woolens in Ireland was prohibited.[21] One of the most arbitrary laws against the colonists solicited by British manufacturers was that no person making woolen cloth in America should be allowed to expose the same for sale. The law was never enacted, but instructions to the Council of Trade, under Charles I, indicate that in Great Britain itself housewives could not make cloth for use outside their own families and were not permitted to sell the product of their own weaving "to the discouragement of the clothier and the draper."[22]

The object of the colonial policy of Great Britain, to engross the trade of the colonies and to stimulate the consumption of English manufactures in their markets, differed in detail but not in principle from that of other European countries. The commercial policy of Holland, which governed to some extent the early history of New York and Delaware, was, like other industrial legislation of that progressive country, in some respects more liberal than that of England. But previous to the repeal of her navigation acts, under the monopolies granted her chartered trading companies, commerce was restricted and manufactures were regulated as carefully as in the British possessions. The "Freedoms and Exemptions" of the New Amsterdam settlers forbade their making any woolen, linen, or cotton cloth, or weaving any other stuffs, on pain of banishment and other arbitrary punishment,[23] but this law either was not enforced or soon was abrogated. The policy of France, controlling what was destined to be the central territory of the American Republic, differed from that of England in regard to manufactures, because her industrial interests also were different. The staple manufactures of France even at that time catered to the wants of more luxurious consumption and were not so well suited for the Indian and colonial trade, or so cheaply produced, as those of England. The fur traders of Canada were dependent on the British colonies for many of the supplies they bartered. So the Canadian governors, like the earliest Virginia governors, actively encouraged manufactures. The royal instructions to the intendant of New France, dated March 27, 1665, direct him to "observe that the establishment of manufactures and the attraction thither of fabricators of articles essential to the purposes of life constitute one of the great wants of Canada."[24] Twenty years later the colonial minister of France wrote to the authorities in the new settlements: "Nothing is of greater importance than to accustom them [the colonists] to

[21] Gross, *The Gild Merchant*, I, 145, 146.

[22] *Cf.* 10 and 11 William III, Chap. 5, § 19; Cunningham, *Growth of English Industry, Modern Times*, I, 374–379, 903.

[23] O'Callaghan, *Documents Relative to the Colonial History of New York*, II, 557.

[24] "Royal Instructions to Sieur Talon, Intendant in New France," in O'Callaghan, *Documents Relative to the Colonial History of New York*, IX, 28.

industry, and means must be adopted to establish manufactures suitable to the country."[25] A few years earlier the intendant of the province negotiated with New England for shipwrights, mill mechanics, and other skilled tradesmen.[26] In Louisiana, too, the authorities were favorably disposed toward manufacturing industries. Nevertheless, in the British colonies manufactures persisted despite the opposition of the home government, and in New France they languished in spite of the hopeful encouragement of the royal authorities. In 1749 the traveler Kalm observed that mechanics were fewer in Canada than in the English colonies,[27] and after the British conquest industries and the demand for labor seem to have become more active; for a marked rise of wages followed that event.[28]

The public policy of Great Britain toward manufactures in the colonies was embodied—

First, in laws relating to trade and navigation;

Second, in laws relating directly to manufactures in the colonies and England;

Third, in administrative action with regard to laws passed by the colonial legislatures;

Fourth, in the general administrative policy relative to colonial industries and settlement.

NAVIGATION ACTS IN RELATION TO COLONIAL MANUFACTURES

The navigation acts date from long prior to the English settlements in America, but their character and object were changed when they were applied to colonial trade. So far as they related exclusively to shipping, they did not differ in principle, or materially in detail, from the present coastal shipping laws of the United States as applied to our insular dependencies. Their influence, detrimental or otherwise, upon colonial commerce and manufactures arose chiefly from the attempt England made to monopolize the trade of the colonies, by requiring their important products to be marketed in England and their purchases of manufactured supplies and other imported goods to be made in the same country. Prior to the navigation act of 1651, the trade of the colonies was practically free, though there were earlier laws requiring Virginia tobacco to be sold in England. Nine years previously Parliament had exempted merchandise intended for the colonies from export duties, subsidies, and other taxation, except the excise, and permitted colonial products to be brought into England

[25] Reply of M. de Seignelay (Minister) to the letters of M. de Denonville, Aug., Nov. 1685, in O'Callaghan, *Documents Relative to the Colonial History of New York*, IX, 277.

[26] Talon, M. Jean, "Memoir to the King on the State of Canada," Nov. 2, 1671, in O'Callaghan, *Documents Relative to the Colonial History of New York*, IX, 72.

[27] Kalm, *Travels into North America*, II, 220–236.

[28] Anburey, *Travels through the Interior Parts of America*, I, 223–224.

free of import duties.[29] These privileges were conditional upon the goods being carried in British ships. Hitherto the Dutch had engaged largely in this commerce, and it will be remembered that it was a Dutch master who brought the Pilgrim Fathers to Plymouth. The effect of exempting for a time the colonial trade from tariff burdens was probably to discourage infant manufactures in America, by making imported goods cheaper than hitherto and by enabling the colonists to obtain a better price for their raw materials in England. But this would not apply to lumber, already the most important export manufacture. The law of 1651,[30] which was intended to confine trade between Great Britain and the colonies to British and colonial vessels, with English captains and crews, was laxly enforced. Cromwell, in order to avoid the Spanish privateers, was obliged to allow the trade with America to be managed in Dutch bottoms.[31]

The act of 1651 continued to be renewed and amended throughout the colonial period. In 1660 it was made more specific by inserting a list of articles produced in the colonies that could be shipped only to England. These, known thereafter as the enumerated commodities, included sugar, tobacco, cotton, indigo, ginger, and dye-woods. Most of these productions came from the West Indian colonies, tobacco alone being at that time an important article of produce on the mainland. Consequently the main effect on colonial industry was to compel southern planters to sell in a monopoly market, thereby forcing them to accept a somewhat lower price for their tobacco than if they had been free to ship directly to Europe and, by giving them smaller returns for their crops, encouraging them to produce at home more of the articles they consumed.[32] In 1663 a third and final principle was introduced in this legislation, requiring that all European commodities imported into the colonies should be carried first to England, and there laden in English or colonial vessels for America. This added to the price of freight and gave a third profit to the English middleman, thereby increasing the cost of European manufactures to the colonials and to that extent encouraging local manufactures. In 1696 the colonies were forbidden to export their products directly to Scotland or Ireland. The list of enumerated commodities differed at different times, and included tar, pitch, turpentine, hemp, masts, yards, pig and bar iron, pot and pearl ashes, and hides. In 1766 the list was made all-inclusive, to cover every production of the colonies. But the colonists retained a right, which they had long possessed, to export

[29] Winthrop, *History of New England from 1630 to 1640*, II, 269; Weeden, *Economic and Social History of New England*, I, 148; Bishop, *History of American Manufactures*, I, 303; Gibbins, *Industry in England*, 365–366; Busching, *Entwickelung der handelspolitischen Beziehungen zwischen England und seinen Kolonien*, 7–8.

[30] Scobell, *Collection of Acts and Ordinances*, II, 176–177; Beer, *Commercial Policy of England*, 31, Note 4.

[31] Brewster, *Essays on Trade and Navigation*, 99.

[32] Bruce, *Economic History of Virginia in the 17th Century*, II, 466.

many articles to countries south of Cape Finisterre—that is, to those nations that had no industries rivaling those of England.

The general effect of these laws upon colonial manufactures was much tempered by their poor enforcement. Their evasion appears to have been so common in the northern and central colonies that contraband commerce was recognized as a conservative form of trade, and no moral obliquy and little financial risk attended that traffic. Detailed accounts of these evasions belong properly to a history of commerce rather than of manufactures; suffice it to say that European goods found their way freely to colonial markets without paying the tax of carriage and transshipment at an English port, and colonial produce not infrequently found an outlet directly to Europe.[33] But one provision of the law was more generally observed, for the colonies as well as the mother country were interested in its enforcement. That was the requirement that trade be confined to British or colonial vessels.

An unquestioned result of these acts, consequently, was to encourage ship-building in the colonies and to foster the colonial carrying trade.[34] Incidentally, by throwing more of the over-sea traffic into the hands of colonial ship-owners, this made all commerce more free—or at least more subject to American control—and opened wider markets for such crude manufactures as lumber and provisions. The general activity of traffic stimulated all home industries, by increasing capital and employment and consequently manufacturing.

Whatever the general influence of these laws may have been on the prosperity of the colonies, they seem only indirectly to have affected homespun industries. Governor Berkeley, of Virginia, protested against these enactments as "mighty and destructive" to trade and navigation, preventing the introduction of new industries, and, in that colony, even as discouraging the building of ships.[35] Lord Baltimore protested in the same manner against their application to Maryland, though the charter of that colony provided that its produce should be shipped only to England.[36] When the navigation acts first were enforced in the tobacco colonies, and Dutch competition for the carrying trade was removed, freights more than doubled, rising in 1657 and thereabouts from £4 sterling a ton to £9 and even £14.[37] This result, due probably to the uncertainties of commerce during the war as much as to

[33] Weeden, *Economic and Social History of New England*, II, 556, 557, 612, 659, 661, 717; Randolph, *Report to the Board of Trade*, in Prince Society, *Publications*, XXV, 250; XXVIII, 118; Chalmers, *American Colonies*, II, 141, 319; House of Commons, *Reports*, Apr. 26, 1754, Ser. I, vol. II, 294.

[34] Beer, *Commercial Policy of England*, 155.

[35] Reply of Governor Berkeley to enquiries to the Governor of Virginia from the Lords Commissioners of Foreign Plantations, 1671, in Virginia, *Statutes at Large*, II, 515; *cf.* also *Virginia Magazine of History and Biography*, I, 141.

[36] Letter of Lord Baltimore to the Lords of the Commission on Trade and Plantations, Mar. 26, 1678, in Maryland, *Archives, Proceedings of Council*, V, 265.

[37] Bruce, *Economic History of Virginia in the 17th Century*, I, 354.

the new law, seems to have been attributed largely to that act. High freights, combined with low prices for tobacco, made the Virginia colonists take up home manufacturing, and during the latter half of the seventeenth century, as we shall see in the next chapter, the Assembly passed several laws to encourage the weaving of homespun cloth and the tanning of leather. Later, with the reviving prosperity of agriculture, these efforts abated, notwithstanding that the navigation acts were still in force and even had been strengthened. In the central and northern colonies these acts, so far as they were enforced, brought with them compensating advantages and disadvantages, but they appear on the whole not to have been unfavorable to such manufactures as then existed.[38] Besides encouraging ship-building, as just mentioned, by stimulating the demand for vessels both at home and in Great Britain through a monopoly of the carrying trade, they favored subsidiary industries, such as the manufacture of cordage, the packing of salt provisions, and the production of flour, ship's bread, and other stores for the merchant marine. Probably by restricting outside markets and loading commerce with artificial costs they made imported goods more expensive and the exportation of raw materials upon the whole less profitable. To the extent that they produced these effects, which were connected logically with the purpose of these laws, they created an opening for domestic manufactures. The usual response to amendments increasing the strictness of the acts, or to measures for their better enforcement, was renewed attention on the part of the colonists to home industries.

INFLUENCE OF BRITISH CUSTOMS LAWS UPON COLONIAL MANUFACTURES

We have seen that for a short time, during the early history of the colonies, their commerce was unrestricted and they enjoyed practically free trade with the mother country. Subsequently duties were imposed on this commerce, producing sufficient revenue to receive attention from the government; and later, though revenue considerations were subordinated to the promotion of English industries, such duties continued to be important in the British fiscal policy.[39] It was during this last period that customs laws had most influence upon colonial manufactures.

These duties were usually collected in England, either in the form of import duties upon colonial produce, which under the navigation laws must be brought to that kingdom, or in the form of export duties on goods shipped to the colonies, which by the same laws included nearly all foreign manufactures used in America. An evasion of the navigation acts therefore was an evasion of revenue collections. How-

[38] Bishop, *History of American Manufactures*, I, 324.
[39] Cunningham, *Growth of English Industry, Modern Times*, I, 459.

ever, a law passed in 1672 laid duties on the enumerated commodities, equal to the English excise, even when they were carried from one colony to another.[40] There were other exceptions to the general policy of trying to make the stream of colonial traffic pass through the custom-houses of England and taxing it at those points. The most notable of these was the sugar act of 1733, which levied a prohibitory duty on sugar, molasses, and rum imported directly into the colonies from any foreign port. This was aimed at a profitable commerce established between the North American colonies and the French, Spanish, and Dutch sugar islands in the West Indies, and was intended to give the English sugar islands a monopoly of the American market. This law was burdensome to the distilling industry of New England, which depended on cheap molasses for its prosperity. Therefore it was resisted by the colonists and so regularly evaded that, according to one authority, "it scarcely affected the tide of commerce, which ran eagerly through illicit channels."[41] The sugar act discriminated against colonial shipping, by permitting sugar to be carried from the British West Indies to southern Europe only in vessels belonging to the mother country. At a still earlier date, England had levied duties upon other goods imported directly into the colonies and appointed officers in America to collect them. These duties had the same effect as a modern tariff in stimulating domestic manufactures, and this effect was reënforced throughout the colonial period by the political opposition to such legislation. A duty of 10 shillings a ton levied upon iron imported into the colonies, in 1679, caused added attention to be given to smelting by the New England settlers.[42] Meanwhile there was a duty upon colonial products entering the mother country. Until 1750 and 1757, iron imported into England from the colonies was subject to a duty, ranging from about $1 a ton on pig iron to nearly $10 on bar iron,[43] and it was not until 1765 that the tax was removed on American iron imported into Ireland. These laws do not seem to have had a very positive effect upon iron-making in America. But the removal of the duty on lumber shipped from the colonies to England, in 1722, gave an appreciable stimulus to the American timber business, though not equally to the sawing of boards and plank.[44] The British market took masts, spars, and other heavy materials for ship-building more readily than manufactured lumber.

Manufactures exported from England to the colonies were liable to one of two possible taxes, besides those levied as internal revenue and paid equally by British and colonial consumers. Goods made in

[40] 25 Charles II, Chap. 7, § 2.
[41] Weeden, *Economic and Social History of New England*, II, 717.
[42] French, *The History of the Rise and Progress of the Iron Trade of the United States, 1631–1857*, 2; Bishop, *History of American Manufactures*, I, 483.
[43] 23 George II, Chap. 29; 30 George II, Chap. 16.
[44] Lord, *Industrial Experiments in the British Colonies*, 103.

England were in some cases subject to an export duty upon shipment to America. In 1700 a heavy export tax previously collected on woolens sent to the colonies was abolished, with a view to discouraging homespun manufactures in the American settlements.[45] Foreign manufactures brought into England for subsequent sale in America paid the usual tariff, but in some instances a drawback was allowed when they were shipped to their destination. Taxes upon manufactures for the American market were thought to encourage colonial industries and therefore did not accord with England's general policy toward her transatlantic possessions. In 1731 a drawback on foreign hemp reëxported to the colonies was abolished, with the express object of encouraging the production of that commodity in America.[46] Except during the three years from 1767 to 1770, there was a drawback on china exported to the colonies. Similar drawbacks on linens and other foreign manufactures shipped to America, amounting to half and sometimes to all the import duty in England, continued until 1763, and enabled these goods to be sold in the colonies about as low as in Great Britain itself.[47] English woolen merchants protested against this remission of duties as favoring the consumption of continental manufactures in America to the displacement of British woolens. It was a special grievance with the woolen interests that East India goods, especially calicoes, were exported to the colonies in large quantities at a time when they were not permitted to be worn in England, thus affording a cheaper and lighter fabric for the colonials. While the large American importations of these manufactures doubtless checked the manufacture of domestic linens and cotton, they created a taste for these lighter goods and disseminated an early knowledge of cotton textiles, that may have contributed remotely and indirectly to the establishment of cotton mills in New England towards the close of the century.

The total influence of British customs laws upon colonial manufactures is hard to estimate. They appear to have aroused less political opposition when manipulated for the purpose of encouraging British industries than later, when they were applied as a source of revenue just before the Revolution. Their net effect, like that of the navigation acts, was to increase the price of foreign manufactures and to lessen the return for domestic produce, so upon the whole they probably caused colonial industries to become more varied and to supply more completely home consumption.

[45] 11 and 12 William III, Chap. 20.

[46] 4 George II, Chap. 28, § 7; *cf.* Beer, *Commercial Policy of England*, 77–82.

[47] *Hardwicke Papers, Memorial Relating to the Bounties on Linen*, in British Museum, *Additional Manuscripts*, 35910, *f.* 5; also in House of Commons, *Reports from Committees* (reprint, 1803), II, 67, pp. 289–290.

LAWS RELATING TO MANUFACTURES

British laws relating to manufactures in the colonies were of two kinds: either they directly restricted or prohibited certain industries, or else they encouraged other industries, not competing with those of England and designed to attract the colonists away from manufactures likely to interfere with the industries of the mother country. Behind the prohibitory and restricting legislation were the urgent petitions of British manufacturers, upon whose proposals the government usually exercised a moderating influence, so that the resulting laws were not so oppressive for the colonists as they would have been had their terms been dictated by the original promoters. In 1706 the London merchants petitioned the Board of Trade that colonial planters be forced to clothe their slaves and servants in British woolens; to which the authorities replied that it would be far better for the merchants to send samples of their goods to the colonies and promote trade by underselling their competitors.[48] In 1731 a memorial to the Lords of Trade asked that the manufacture of woolens, hats, and shoes in the colonies be suppressed. The hatters wished the colonists to be prohibited from either wearing or dealing in any hats not manufactured in England. This agitation resulted in three laws, at different times, directly restricting colonial industries.

The first of these was an act passed in 1699, upon the complaint of English manufacturers and merchants, to the effect that the colonists were exporting wool and woolens to foreign markets in competition with those of Great Britain. As a result, Parliament enacted that after December 1 of that year no wool, woolen yarn, or cloth produced in the colonies should be shipped to any other plantation, or "to any other place whatsoever," under heavy penalties. The penalties and the general provisions of the law were the same as those already in force for Ireland, and copied earlier acts to prevent the exportation of wool from England. The enactment was not an independent statute, but a paragraph of a general law regulating woolen manufactures in Great Britain, Ireland, and the colonies.[49]

Opinion differs, and probably differed at the time, as to the need for such legislation.[50] It did little to interfere with the homespun manufacture of woolen cloth, and apparently did not prevent its continuing an article for neighborhood exchange. The sale of such cloth in more distant markets would hardly have attained sufficient importance to encourage manufactures had no act been in force. By

[48] Great Britain, *Board of Trade Papers, Plantations, General*, 1, 9, quoted in Lord, *Industrial Experiments in the British Colonies*, 130. There is a similar petition in British Museum, *Sloane Manuscripts*, 2717, *ff.* 64–66.

[49] 10 and 11 William III, Chap. 10, § 9; *cf.* British Museum, *Harleian Manuscripts*, 1324, *f.* 60

[50] Weeden, *Economic and Social History of New England*, 1, 393; Bishop, *History of American Manufactures*, 1, 322; Busching, *Entwickelung der handelspolitischen Beziehungen zwischen England und seinen Kolonien*, 32.

preventing the export of wool, the law forced the farmers themselves to manufacture the fleeces they raised. Later British observers saw the mistake of this policy and advocated encouraging the exportation of American wool to England.[51] In fact, the law as a whole accorded very well with some colonial legislation, the purpose of which was to prevent shipping out of the colony wool, iron, leather, and other materials used in manufactures. Yet the law was felt to be oppressive. The efforts of British officials to prevent the carrying of wool from Nantucket and the other New England islands to the mainland were unavailing.[52] The inhabitants maintained that the law did not prevent the transportation of wool by water from one point to another in the same colony. Pennsylvania tradesmen found the new restrictions especially inconvenient and, in 1705, William Penn, who was then in England, promised the secretary of the province to try to have the act amended, "tho' they are very jealous here of encouraging manufactures there."[53] The people of the province were importing wool from Maryland, and probably also the act prevented the West Jersey settlers from bringing yarn or cloth to the Philadelphia market.[54]

In 1732 Parliament prohibited the exportation from one colony to another, or from the colonies to England or Europe, of hats manufactured in America. New England manufacturers, encouraged by cheap fur and freedom from government regulation, had begun to export to Spain and the West Indies. In addition to prohibiting the exportation of hats, the law required substantially the same apprenticeship rules to be observed in America as in England, and prevented negro workmen from being employed in this industry. The effect of this act is variously reported. In New York and possibly a few other colonies it appears to have restricted manufacture; but the New Englanders seem to have evaded or disregarded its provisions, and it is difficult to see how it could have been enforced with much strictness in the midst of the generally lax colonial administration.[55] Furs were not so abundant in some of the colonies later; but the hat-making industry continued to thrive in the same small way as other manufactures of a like character, and was well established at the time of the Revolution.

The third prohibitory law applied to the iron industry, and restricted secondary while it encouraged primary manufactures. An agitation for some law applying to this industry extended over more than thirty

[51] Letter dated Sept. 4, 1764, reprinted from the *St. James Chronicle* (London) in the *Providence Gazette*, Feb. 16, 1761; *History of the British Dominions in North America*, I, 239.

[52] Great Britain, *Board of Trade Papers, New England*, N. 33, quoted in Lord, *Industrial Experiments in the British Colonies*, 129.

[53] James Logan to William Penn, Feb. 5, 1705, in *Penn-Logan Correspondence*, Pennsylvania Historical Society, *Memoirs*, X, 5–6, 68; William Penn to James Logan, July 14, 1705, *id.*, 68.

[54] *Cf.* Macpherson, *Annals of Commerce*, III, 163; *Pennsylvania Gazette*, Oct. 18, 1764, quoted in New Jersey, *Archives*, XXIV, 439.

[55] Chalmers, *American Colonies*, II, 116, 119.

years before Parliament finally took action. As early as 1717 the smiths and other users of iron in London and Bristol petitioned Parliament to encourage smelting in the colonies. In 1719 a bill was introduced to prevent the manufacture in America of hollow ware or other castings, or the erection of forges for refining iron.[56] This would have confined the furnaces in the colonies to producing pigs for British consumers. In 1737 the project was renewed. Neither of these two bills passed Parliament, and it was not until 1750, when the supply of imported iron had been curtailed for a time by an interruption of the Baltic trade, that a law was enacted.[57] It provided that iron should be admitted to Great Britain without duty—the entry of bar iron being for a time restricted to London and Bristol—but prohibited the erection in the colonies of slitting or rolling mills, tilt hammers, or steel furnaces. Such establishments as were already in operation were allowed to continue. The intention of the law was to confine the iron-masters of the colonies to producing iron for British manufacturers and to prevent them from manufacturing iron into tools, implements, and hardware. Casting furnaces were not prohibited, so that the colonists still could make kettles, salt pans, and cannon. The law, applying as it did to a conspicuous manufacture, was fairly well enforced, though slitting mills were sometimes operated in defiance of its provisions. But the secondary manufactures which it was intended to abolish continued, and even increased. The production of pig iron for the English market was encouraged, but it can hardly be shown that it grew more rapidly than it might have done had no such law been on the statute books.

Coördinate with the policy of restricting certain colonial manufactures by statute, was the attempt to promote other manufactures in America. To the need of obtaining naval stores, which we have seen was one object in colonizing America, was added the new motive of diverting colonial industry from competing manufactures by turning it to the production of these commodities. Therefore in 1705 an act was passed granting a bounty of £4 sterling per ton on pitch and tar made in the colonies, £6 a ton on hemp, and £1 a ton on masts, yards, and bowsprits. These acts were continued with some modification for half a century.[58] They promoted the production of the commodities to which they applied, and caused an improvement in the quality of American pitch and tar. But the industry remained in a degree artificial and whenever British encouragements were relaxed the colonists reverted to lumbering and homespun industries. The bounty on hemp and flax could hardly have deprived colonial manufacturers of their raw materials, by causing them to be transported

[56] Scrivenor, *History of the Iron Trade*, 71; Macpherson, *Annals of Commerce*, III, 72–73.
[57] 23 George II, Chap. 24.
[58] Lord, *Industrial Experiments in the British Colonies*, 56–86.

to England; for hemp in large quantities was imported from Europe by colonial rope-makers six years after the last bounty upon that commodity was granted by England.[59] It is safe to assume that these fibers were not largely exported when the local demand was sufficient to cause what were for the time extensive importations.[60] In South Carolina, in 1731, the bounty and exemption from duty on hemp sent to Great Britain were estimated to make an advantage of about 40 per cent over hemp from other parts.[61] In 1769 the British Government, by granting a bounty upon silk, made a last effort to establish in the colonies an industry that had been in view from the settlement of Virginia.[62] Two years later a bounty was given on oak and cooper's stuff brought into England from the colonies.[63] The last law designed to control American manufactures was passed in 1774, the year before the outbreak of hostilities between the colonies and the mother country, and forbade the exportation to America of tools for the manufacture of cotton or linen or of goods wherein these fibers were used, with the exception of wool cards.[64]

The effect of all this legislation, bearing directly upon manufactures, was less than it would have been had the industries of the colonies been more developed. Scattered through remote farming districts and hamlets, subject to little inspection, supported in the main by neighborhood markets and thereby evading control through commercial regulations, and pursued in the midst of a community where the people already were conscious of political and economic interests separate from those of Great Britain, colonial manufactures were influenced but little by parliamentary measures and policies. For this reason, perhaps, these measures were thought much less of a grievance than the Stamp Act and other laws directly related to revenue. They seem not to have aroused much public opposition.[65] Had they hampered seriously the economic activities of the colonists we should have heard more of them in the political controversies of the times.

[59] Boston imported between 400 and 500 tons of hemp from Great Britain between Jan. 1 and June 19, 1770; Mein, *A State of Importations from Great Britain into the Port of Boston.* Hemp was imported from Russia in 1763; Bernard's *Report*, in British Museum, *Kings Manuscripts*, 205, *f.* 405; Eliot, *New England Husbandry*, I, 10.

[60] Mitchell, *The Present State of Great Britain and North America*, II, 145; Lord, *Industrial Experiments in the British Colonies*, Appendix B.

[61] Purry, "A Description of the Province of South Carolina, drawn up at Charles Town, in September, 1731," in *Force, Tracts*, II, 11, p. 9.

[62] 9 George III, Chap. 38. Public Record Office, *Colonial Office Papers*, 324, No. 52, *f.* 5, in British Transcripts.

[63] 11 George III, Chap. 50. The British Government also assisted in establishing potash works in America by removing the duty on that commodity when imported from the Colonies (1751) and by a bounty of 1s. a hundred weight, and the London Society of Arts gave further encouragement; Stephens, *The Rise and Fall of Potash in America.*

[64] 14 George III, Chap. 71; *cf.* Bishop, *History of American Manufactures*, I, 378.

[65] They are cited, however, by a Boston committee of Grievances in 1772; Boston Records Commissioners, *Records Relating to the Early History of Boston*, XVIII, 104, § 9.

DISALLOWANCE OF COLONIAL LAWS BY THE BRITISH GOVERNMENT

Either the governor or the Board of Trade could disallow an act of a colonial legislature, except in the proprietary colonies, where this authority rested with the proprietor. The power was used less frequently after the seventeenth century. In 1680 a Virginia law for encouraging ship-building was disallowed,[66] and a law passed in 1682, to promote the manufacture of cloth and prevent the exportation of wool,[67] was likewise vetoed by the royal authorities. Nevertheless, similar laws were enacted later by the same province. In 1693 the governor of Virginia advised the House of Burgesses to revise the laws encouraging manufactures in accordance with the suggestions of the commissioner of customs.[68] In 1709 the latter officer advised the Lords of Trade to disallow the Virginia acts erecting market towns, lest these lead to the "improvement in the woolen and other manufactures already begun and still carrying on in Virginia and other parts."[69] In 1706 a Pennsylvania law prohibiting the sale of badly tanned leather or its manufacture into shoes was disapproved by the Board of Trade, because "it cannot be expected that encouragement should be given by law to the making any manufactures made in England in the plantations, it being against the advantage of England."[70] Probably with a view to protecting the royal forests, Governor Donegan, of New York, was in 1684 given authority to prohibit the erection of sawmills in that province.[71] But it was the exception for matters of this sort to be left to the discretion of a royal official. Colonial acts imposing duties on goods imported from Great Britain either were vetoed by the governors or disallowed by the home authorities; but such laws did not always come to the attention of the latter until their period of enactment had expired.

The influence of the governors and the knowledge that acts favoring local manufactures not only might be disallowed, but would probably bring upon the colonial government the displeasure of the authorities in England, doubtless prevented some legislation that otherwise would have been enacted.[72] But so many laws were passed, especially in the central and northern colonies, to encourage manufactures and the introduction of new industries, that such British intervention as

[66] Bruce, *Economic History of Virginia in the 17th Century*, II, 437.

[67] Bruce, *Economic History of Virginia in the 17th Century*, II, 464; Great Britain, *Calendar of State Papers, America and West Indies*, 1681–1685, 529, Oct. 26, 1683; *MacDonald Papers*, VI, 269.

[68] Great Britain, *Calendar of State Papers, America and West Indies*, 1693–1696, 199, Oct. 30, 1693; Sainsbury, *Abstracts*, V, 162.

[69] Sainsbury, *Abstracts*, VIII, 189.

[70] Pennsylvania, *Statutes at Large*, II, 466–481; *cf.* Chalmers, *American Colonies*, I, 392.

[71] Sir John Werden to Governor Donegan, Dec. 4, 1684, in O'Callaghan, *Documents Relative to the Colonial History of New York*, III, 353.

[72] *Cf.* Governor Nicholson to the Council of Trade: "But the cursed thing called self-interest too much governs them, for they have a notion that if they should own that manufactures and handicraft trades are encouraged in these parts, then an act of Parliament will be passed in some manner to restrain them"; Great Britain, *Calendar of State Papers, America and West Indies*, 1696–1697, 546, July 13, 1697.

occurred must be regarded rather as indicating the passive disposition of the home government than as defining an administrative policy rigorously carried out. The positive effect upon colonial manufactures of the disallowance of these local laws was very slight, even if we assume, what is by no means certain, that such laws might have aided manufactures; for this power was too seldom exercised seriously to deter such legislation.

BRITISH ADMINISTRATIVE POLICY AND COLONIAL MANUFACTURES

The administrative policy of Great Britain toward colonial manufactures was expressed not only in the disallowance of colonial laws, but also in instructions to the royal officers in America and in ordinances and treaties governing colonial trade and settlement. The instructions to the governors were effective only so far as those officers were able and disposed to obey them. Some governors were colonials, who sympathized with the commercial and manufacturing ambition of the colonists. Even governors from England sometimes preferred easy duties and local popularity to the commendation of the home authorities at the price of a tumultuous, embarrassed, and unpopular administration. Other governors formed profitable business connections in America. Therefore many royal officers either ignored, or obeyed in form rather than in spirit, general instructions of the home government that did not accord with the interests and wishes of the colonists. But some governors were alertly jealous of colonial manufactures, advised the government of their progress, and suggested measures to suppress them; and their official correspondence even conveys the impression that the home authorities were lukewarm, as compared with their representatives in America, in the desire to keep the colonies industrially dependent upon the mother country. Where such officers were sincere and energetic, their political and social influence combined may have prevented some manufacturing undertakings, but they possibly did more to promote American consumption of English goods by introducing new fashions and personally setting the mode for imported articles than by directly discouraging local manufactures.

By the time of the French and Indian War English statesmen saw that natural conditions would do more than legal enactments to maintain the supremacy of British manufactures in the colonial market. When at the close of that war there was a promise of the rapid extension of settlement westward, concern was awakened lest this new condition stimulate competing industries in America. Measures therefore were taken to check or prohibit such settlements. This policy was dictated partly by dread lest the aggressions of settlers upon tribal lands might cause a renewal of Indian wars, but fear that settlements distant from the sea would manufacture for themselves was also prominent. A paper relating to Indian affairs, laid before

the Board of Trade in 1768, after noting that land must be opened for settlers rapidly enough to encourage agriculture at the expense of manufactures, recommends that settlements in the interior be nevertheless prohibited, on the ground that land enough for the existing population of America could be found on the Atlantic seaboard and that more distant settlements, inaccessible to shipping, could not receive goods conveniently from abroad or make profitable returns for them, and therefore would be forced to produce these articles by their own industry, "a consequence which, experience shows, has constantly attended, in a greater or less degree, every inland settlement."[73]

With this opinion, Benjamin Franklin, who was interested in procuring a land grant in the Ohio Valley, took issue, and in a paper quoted elsewhere he showed that the great river system of the central continent would afford ready access for British manufactures and an outlet for agricultural produce and other raw materials.[74] The independence of the colonies came too soon to permit this policy of restricting the limits of settlement to influence appreciably American development; but Franklin was probably right in his contention, and the western pioneers opened markets for imported goods far greater than the nascent industries of that new country could supply. Manufactures might increase in America, but they would not increase so rapidly as consumption, provided settlers were left free to open new territory for development in proportion as their numbers augmented.

EQUITY AND RESULTS OF BRITISH POLICY TOWARD COLONIAL MANUFACTURES

Apart from the specific effect of individual measures or groups of measures upon American manufactures, there remains to be considered the total influence of the British connection upon the progress of colonial industries. Both modern and contemporary writers differ in their estimate of this influence. Among recent students, Busching does not doubt that, "the policy of the mother country, in hampering industrial development in the colonies, greatly hindered their industrial progress."[75] Speaking more particularly of New Englanders, Weeden says, "They had grown up doing things they found profitable, whatever the British laws had been."[76] This was the view of a contemporary defender of British policy, who asserted:

[73] Lords Commissioners for Trade and Plantations, *Report on the Petition of Thomas Walpole, with Observations and Remarks by Benjamin Franklin*, 9–10; also in Franklin, *Works*, v, 469, 472.

[74] Franklin, *Works*, iv, 57–58; v, 504.

[75] Busching, *Entwickelung der handelspolitischen Beziehungen zwischen England und seinen Kolonien*, 71. In 1748, Kalm had remarked: "These and some other restrictions occasion the inhabitants of the English Colonies to grow less tender for their Mother country"; Kalm, *Travels into North America*, i, 206.

[76] Weeden, *Economic and Social History of New England*, ii, 723.

"They [the colonists] are not hindered from making any commodity they might have thought for their own use, or erecting any machine for the purpose except mills for slitting iron. The only reason is that they find it more their interest to cultivate their lands and attend the fisheries than to manufacture. . . . I therefore repeat it, that the only means employed by the legislature for diverting the colonies from manufacturing is the giving them better prices for their labor in other things: and the colonies well know this to be the case, they conduct themselves according to that knowledge; for in every instance where they think they can employ their labor profitably in manufacturing they do. This the people of England do not know, but they ought to be made acquainted with it. They imagine that the inhabitants of the colonies are prohibited from making any thing for themselves, much more from trading in their own manufactures, whereas, the fact is that they are prohibited from making no one thing for their own use or from exporting any one of their own manufactures except hats, wool, and woolen goods, and they do make many things and export several manufactures to the exclusion of British manufactures of the same kind."[77]

These conditions were even ascribed at times to the very regulations of the British Government restricting colonial commerce and industries. Not a few persons thought that Great Britain's colonial policy as a whole was favorable rather than otherwise to manufactures in America. About the time of the Revolution a writer thus reviewed the measures that had made the colonists diversify their industries.

"I. To confine the colonies to their present bounds, and to cut them off from all the more fruitful parts of the continent, which would produce anything for *Britain*, or enable the colonies to make remittances to her.

"II. To lay duties on many of the goods they have from *Britain*, which so enhanced their price that the merchants could not deal in them; and at any rate such duties could only be an additional premium on the manufactures of the colonies, which are already very great, from the dearness of English goods.

"III. To restrain their trade, which is already so limited, that it will not maintain a tenth part of the people; and to lay new impositions on that trade, by which they are already losers, although many of the colonies have no other source of remittance to *Britain*."[78]

In other words, the argument is that the British colonial policy, by hampering primary industries and increasing the price of British manufactures in America, checked the exchange of raw materials for finished goods between the two countries and therefore forced the colonists to manufacture for themselves. Another writer, reviewing the economic influence of the connection with Great Britain, enumerated the advantages the colonies received from that connection as follows: military protection; protection for colonial ship-building and shipping under the navigation acts; encouragement of naval stores and iron manufacture by premiums and opening to them a protected Eng-

[77] *Interest of the Merchants and Manufacturers of Great Britain in the Present Contest with the Colonies Stated and Considered*, 20.

[78] Mitchell, *The Present State of Great Britain and North America*, 304–305 (note).

lish market free or privileged trade with other parts of the Empire, especially the West Indies; the benefit of Great Britain's commercial treaties opening to the colonies European markets for fish, oil, flour, rice, and some other products. Against these were set the disadvantages of restricted trade without the Empire and laws preventing or discouraging the manufacture within the colonies of steel, woolens, and hats.[79]

If contemporary observers could not agree, or maintained a suspended judgment, as to the influence of British policy upon colonial manufactures, we can hardly expect at this day to estimate exactly that influence or to conjecture with any degree of probability what different result might have followed had the colonies been entirely free to shape their economic destinies. But in studying those times, the presumption becomes better defined with every new detail of fact revealed, that upon the whole the industrial development of the colonies was about where it would have been had their economic policies been governed by their own people. Natural influences were vastly more important than political policies in determining that development. The manufactures that were checked by British laws remained unimportant under the Republic, until stimulated by influences not present during the colonial period. Steel and woolen manufactures, for export or even extensive local interchange, were not established until many years after our political ties with Great Britain were severed. If the commercial and political influence of England repressed some colonial industries, more perhaps by general disapproval than by specific prohibitions, this was counterbalanced, in part at least, by certain advantages which the colonies derived from the imperial connection. They had approximate free trade among themselves and with the British West Indies, which assured the manufacturers of New England and the central colonies an open market in the plantation provinces. Balancing advantage against disadvantage, their manufactures seem not to have been retarded or furthered decidedly by subordination to the British Government.

[79] Gilpin, "Notes on the History and Principles of the Tariff," in McLane, *Report on Manufactures*, II, 838.

CHAPTER III

COLONIAL LEGISLATION AFFECTING MANUFACTURES

Compulsory manufactures, 31. Public industries, 32. Bounties, premiums, and subsidies on raw materials and manufactures, 33. Land grants, loans, and lotteries in aid of manufactures, 39. Legal tender and tax laws, 44. Monopolies and patents, 47. Export regulations and tariffs, 53. Import duties and tonnage laws, 56. Regulation of mills and other industrial establishments, 63. Regulations to assure the quality of manufactured commodities, 64. Miscellaneous laws affecting manufactures, 67. Inferences and conclusion, 70.

The measures of the colonial governments to encourage manufactures are embodied in legislative grants and enactments and in the privileges and direct assistance given local industries by town and county authorities. Some early acts in New England and Virginia enjoined certain industries upon the people, and in a few instances public manufactures were established. But most of these laws were based on British precedent, and aimed to encourage manufactures in the colonies by bounties and other forms of public aid, by providing abundant raw materials, and by maintaining standards of workmanship and quality. Incidentally, tariff laws occasionally afforded protection to colonial wares; training in the industrial arts also was an object of solicitude, and there was some miscellaneous legislation, especially the acts relating to towns and markets in Virginia and Maryland, intended to encourage artisans to settle and to ply their trades in America.

COMPULSORY MANUFACTURES

In 1655 Massachusetts passed a law directing the selectmen of every town to ascertain the number of persons in each family competent to spin yarn and the fraction of their time other duties permitted them to engage in this occupation. On this basis a certain number of spinners was assessed against each household, and for every spinner it contained a family was required to produce three pounds of linen, cotton, or woolen yarn a week for thirty weeks, or for a fraction of a spinner's time a pro rata amount. Any family failing to produce this amount of yarn was fined 12 pence for every pound shortage.[1] An early Virginia law forbade mechanics to plant tobacco or corn, thus indirectly forcing them to ply their trades.[2] Laws were passed in Virginia and Connecticut requiring the inhabitants to plant flax for linen and hemp

[1] Massachusetts, *Colonial Laws*, 141.
[2] Virginia, *Statutes at Large*, I, 208.

for cordage, and in the former colony a tax in kind, of flax or hemp, was imposed.[3] Connecticut forced its towns to purchase cotton, imported under public auspices, in proportion to their population.[4]

PUBLIC INDUSTRIES

Virginia required the counties to conduct public manufactures. In 1661 an act was passed ordering each county to establish one or more public tanneries and to provide tanners, curriers, and shoemakers.[5] The manager of the tannery was to pay 2 pounds of tobacco for each pound of dry hides, and to sell plain shoes for 30 pounds of tobacco a pair, and wooden heel and French fall shoes at 35 pounds of tobacco a pair. For failing to comply with this law, a county was fined 5,000 pounds of tobacco. In 1666 the same province by public act required every county to set up within two years a county loom with a weaver.[6] Four of the newer and less settled counties were allowed four years within which to comply with this condition. The preamble of the act indicates that it was passed to meet conditions caused by the navigation law of three years before: "The present obstruction of trade and the nakedness of the country do sufficiently evidence the necessity of providing a supply of all our wants by improving all means of raising and promoting manufactures among ourselves." This loom law indicates that the county tannery law of five years earlier was thought successful enough to justify extending public manufactures. There is other testimony that these enactments were not without results.[7] Stamford, Connecticut, built a dam and mill as a municipal enterprise, but apparently sold them before the mill went into operation.[8] No other attempts were made to establish public manufactures by general enactment, though township enterprises may have been started, until the approaching war with the mother country compelled most of the colonies to manufacture arms and ammunition for their own defense.[9] In 1776 Rhode Island attempted to provide saltpeter works in every township.[10] Marylandestablished a gun-lock factory at Frederick. Virginia manufactured salt and many of its war supplies.[11] And Congress operated furnaces to cast shot and cannon for the Continental Army.

[3] Virginia, *Statutes at Large*, I, 218; II, 26, 306; Connecticut, *Public Records*, I, 61, Feb. 1640; 79, Oct. 1642.

[4] Connecticut, *Public Records*, I, 59–60, Feb. 1640; 75, Sept. 1642.

[5] Virginia, *Statutes at Large*, II, 123; *cf.* Bruce, *Economic History of Virginia in the 17th Century*, II, 482, Note 1.

[6] Virginia, *Statutes at Large*, II, 238.

[7] Virginia, *Statutes at Large*, II, 241.

[8] Huntingdon, *History of Stamford*, 22. Hartford and doubtless other towns owned public mills; *cf.* Caulkins, *History of New London*, 66; Atwater, *History of the Colony of New Haven*, 158; Connecticut, *Historical Collections*, VI, 108–109.

[9] Georgia had a public sawmill, *A True and Historical Narrative of the Colony of Georgia*, in *Force, Tracts*, I, 4, p. 26, as did also New York; O'Callaghan, *Documents Relative to the Colonial History of New York*, I, 181.

[10] Rhode Island, *Records*, VII, 429.

[11] Virginia, *Statutes at Large*, IX, 71, 94, 123, 197, 237, 310.

BOUNTIES, PREMIUMS, AND SUBSIDIES ON RAW MATERIALS AND MANUFACTURES

Among the most prominent colonial laws relating to manufactures, were those providing bounties, premiums, and subsidies. Bounties, which were the most common, applied properly to all articles of a specified kind and quality, and were designed to promote an abundant production. Premiums were given for a few specimens of exceptional quality, and logically were intended to raise the standard of manufactures. Subsidies differed from bounties and premiums in being offered only to a particular person, instead of to any producer, though like the former they were paid upon products. For this last reason they are not to be confounded with such forms of aid to specific individuals or companies as loans, land grants, lotteries, monopolies, and other assistance not based on the amount and quality of the articles manufactured.

Bounties on raw materials were given to encourage manufactures rather than agriculture, even when they applied to such agricultural commodities as hemp, flax, and wool. After the British government subsidized naval stores from America, some colonial flax and hemp bounties were intended to foster the production of those commodities for British use, and therefore directly to affect agriculture rather than manufactures. But except in a few of the planting colonies, the local market continued to absorb most of these products; so that in spite of the artificial inducement to export, the resulting increase in raw materials was a benefit principally to colonial tradesmen.

The earlier bounties on raw materials related exclusively to home manufactures, and in the preamble or body of the acts providing them they are stated to be for the purpose of encouraging domestic spinning and weaving and discouraging the importation of cloth from abroad. For example the Maryland law of 1671, which granted a bounty of a pound of tobacco for every pound of hemp raised in the province, and 2 pounds of tobacco for every pound of flax, was due to the "great quantities of linen cloth and other wares wrought by manual occupation which are brought from foreign places."[12] The law was successful enough in the minds of the provincial legislators to be reënacted at least twice, and continued in force for a quarter of a century. In 1727 the same colony granted a bounty on hemp alone, equal to that provided by the previous law, but this time for the purpose of supplying England with that commodity. Hemp bounties were granted, in coöperation with the British acts of 1722 and 1764, subsidizing American naval stores, in 1722 by Virginia, South Carolina, and Pennsylvania; in 1763 by New York; in 1764 by North Carolina; in 1765 by New Jersey; and in 1769 again by Virginia. In 1732 the Pennsylvania bounties were dis-

[12] Maryland, *Archives, Proceedings of the Assembly*, II, 300; VII, 325, 496.

continued, because large quantities of hemp were already produced and good prices obtained.[13] The preparation of hemp for market was considered a manufacture. The New Jersey and South Carolina laws also provided a bounty on flax. In 1770 South Carolina, in an act to encourage linen manufactures, granted a bounty of £12 proclamation money on every hundredweight of flax raised and dressed in the colony.[14] That the New England bounty laws were passed with less regard for British requirements than those of the other colonies is indicated by their dates. About 1700 Massachusetts had an act on its statute books "to encourage the sewing and well manufacturing of hemp," and compelled local cordage-makers to use hemp raised in the province.[15] In 1721 Rhode Island granted a bounty of 6 pence a pound on water-rotted hemp raised and prepared in the colony, and the next year encouraged its manufacture into cloth.[16] Thirty years later the same colony granted a bounty of a penny a pound on flax cured and dressed within its boundaries.[17] In 1734 Connecticut offered a bounty of 4 pence a pound on water-rotted hemp.[18] The same colony and some of its southern neighbors endeavored to promote the production of silk by bounties. The only raw materials that received this form of encouragement were textile fibers, which were always in local demand and which were relatively less abundant in America than the gross commodities used in other manufactures. Hemp never was exported extensively to England, even when the bounty was highest, and though burdened with British duties and extra freight, it was imported in considerable quantities from Europe by New England rope-makers.[19]

The most numerous and important colonial bounties were for textiles. The jealous watch that England kept over American woolen manufactures caused relatively more attention to be given to linen, though in the seventeenth century woolen bounties were not uncommon. In 1640 Massachusetts gave a bounty on cloth made in the colony from native wool.[20] In 1662 Virginia gave a bounty of 5 pounds of tobacco for every yard of woolen cloth made in the province; and in 1682, by a second law, made the bounty 6 pounds of tobacco for every yard of woolen or mixed fabric of home manufacture.[21] In the latter year Maryland, following a precedent established by Virginia twenty years before, even discriminated in favor of woolen homespuns, by granting a bounty of 10 pounds of tobacco a yard for this cloth, as compared with only 6 pounds a yard for linen.[22] However, after the

[13] Pennsylvania, *Statutes at Large*, IV, 231.
[14] South Carolina, *Statutes at Large* (ed. Cooper), IV, 315.
[15] Massachusetts, *Acts and Laws*, 1726, 169.
[16] Rhode Island, *Acts and Laws*, 1730, 149, 273; *id.*, 1745, 297; Rhode Island, *Records*, IV, 317.
[17] Rhode Island, *Acts and Laws*, Apr. 1751, 116.
[18] Connecticut, *Public Records*, VII, 512, May 11, 1734.
[19] See p. 25, preceding.
[20] Massachusetts, *Records of the Governor and Company*, I, 316.
[21] Virginia, *Statutes at Large*, II, 120, 503.
[22] Maryland, *Archives, Proceedings of Assembly*, VII, 325.

British woolen act of 1699, but a single colony ventured to give direct encouragement to this manufacture. In 1751 Rhode Island offered a bounty of one-third its value on woolen cloth made in the province; but the law was repealed three months later because "it may draw the displeasure of Great Britain upon us, as it will interfere with their most favorite manufactory."[23] The renewal of the woolen bounties by some of the colonies, in 1775, was one of the first acts of revolt against the mother country.

Bounties on linen and duck continued to be given throughout the colonial period, either by separate acts or in connection with the early encouragements of woolen manufactures. They begin with the Massachusetts law of 1640, which provided the same bounties, relatively to their value, for cotton and linen homespun as for woolen. The Virginia acts of 1662 and 1682, the latter of which was renewed in 1686 and 1691, and the Maryland act of 1682, also applied to linen; but in those laws cotton is not mentioned. In the next century comparatively more support was given flax manufactures. After 1720 a determined and not altogether unsuccessful effort was made in New England to establish the manufacture of linen and sailcloth. Both public aid and private enterprise coöperated in this endeavor.

In 1730 Virginia passed a law, subject to royal approval, however, granting a bounty of 2 pounds of tobacco for every ell of osnaburg, and twice that amount for every ell of doulas, made in the province.[24] In 1734 Connecticut provided a bounty of 2 shillings a yard upon linen made in the colony, "well spun, woven and whitened, a yard wide, and made of yarn eight runs to the pound," with pro rata bounties for finer cloths or those of different widths.[25] The act was amended the following year, somewhat reducing these bounties, and continued on the statute books fifteen years longer. Its reënactment indicates that it was considered successful. In 1770 South Carolina passed a law granting a bounty of 30 per cent their value upon all linens and linen thread made in the province.[26]

Efforts to promote the manufacture of duck were confined to New England, where ship-building, fishing, and commerce created demands for this material. In May 1726, apparently in response to a petition from John Powell, a Boston merchant, who undertook to establish the manufacture in America if given proper encouragement, the Massachusetts Assembly granted a bounty of 20 shillings for every bolt of canvas of specified dimensions and quality made in the colony; and a newspaper notice two years later indicates that the bounty was then

[23] Rhode Island, *Public Records*, v, 318–319, *cf.* Bagnall, *Textile Industries*, 50.
[24] Virginia, *Statutes at Large*, iv, 293.
[25] Connecticut, *Public Records*, vii, 512, May 1734.
[26] South Carolina, *Public Laws* (ed Grimké), liii, No. 1109; South Carolina, *Statutes at Large* (ed. Cooper), iv, 315.

in force.[27] In 1734 Connecticut, by a section of the law mentioned in the previous paragraph, offered a bounty of 20 shillings for every bolt of "well wrought canvas or duck, fit for use, of thirty-six yards in length and 30 inches wide, and weighing not less than 45 pounds, made of well-dressed, water-rotted hemp or flax."[28] Connecticut's efforts to promote silk raising and manufacturing began with bounties on sewing silk, silk stockings, and silk stuffs, in 1734,[29] and were repeated by a bounty on raw silk and mulberry trees enacted in 1784.[30]

Bounties for other manufactures were less important. In 1661, when the enforcement of the navigation act raised freights, Virginia offered, for sea-going vessels built and permanently owned in the colony, bounties ranging from 50 pounds of tobacco per ton for small craft to 200 pounds of tobacco per ton for vessels of over 100 tons burden.[31] In 1711, and again in 1753, South Carolina offered bounties to persons building ships and to shipwrights settling in the province. The latter act was repealed the following year, because it "hath not proved any encouragement either to the building of ships or for shipwrights or caulkers to become settlers in this province."[32] In 1722 Virginia offered a bounty of 2 shillings a barrel for tar, if made in conformity with the requirements of the British admiralty, without girdling the trees.[33] South Carolina in 1707 and 1711 and North Carolina in 1773 granted bounties for potash made within their respective jurisdictions;[34] and in 1694 the former colony offered a bounty for salt, indigo, and wine.[35] During the Revolution, Maryland and Rhode Island granted bounties for salt made in those States.[36] South Carolina in 1707, Virginia in 1745, and other States during the Revolution provided bounties for the manufacture of saltpeter.[37] During the Revolution also State bounties were granted on gunpowder and firearms.[38] At various times Massachusetts offered bounties for such minor manufactures as stoneware and wool cards.[39] A North Carolina potash bounty, which was not successful, was designed to encourage manufacture for export. In 1723 Pennsylvania passed a law establishing a

[27] Massachusetts, *Acts and Resolves*, XI, Appendix VI, 52, 724; *Boston Newsletter*, Feb. 1, 1728.

[28] Connecticut, *Public Records*, VII, 512, May 1734.

[29] Connecticut, *Public Records*, VII, 495, May 1734.

[30] Connecticut, *Acts and Laws*, May 1784, 282.

[31] Virginia, *Statutes at Large*, II, 122, 178.

[32] South Carolina, *Laws of the Province* (ed. Trott), 185, 323, 241; South Carolina, *Statutes at Large*, (ed. Cooper), IV, 11; II, 365

[33] Virginia, *Statutes at Large*, IV, 96.

[34] South Carolina, *Laws of the Province* (ed. Trott), 149; South Carolina, *Statutes at Large* (ed. Cooper), II, 307; North Carolina, *Acts of Assembly* (ed. Davis), 559.

[35] South Carolina, *Laws of the Province* (ed. Trott), 34.

[36] Rhode Island, *Records*, VII, 541; Maryland, *Revolutionary Laws* (ed. Hanson), 1780, Chap. 20.

[37] South Carolina, *Laws of the Province* (ed. Trott), 149; Virginia, *Statutes at Large*, V, 362, IX, 71.

[38] Bishop, *History of American Manufactures*, I, 516, 591–592; Weeden, *Economic and Social History of New England*, II, 793.

[39] Massachusetts, *Archives*, LIV, 332, 395, 402.

bounty of 2 pence a gallon on spirits distilled in the province when "carried out to sea."[40]

Private societies or individuals sought to encourage skill and industry by premiums more frequently than by bounties, which involved the payment of uncertain and sometimes large sums of money. Probably public premiums were offered as a compromise, when the reluctance of tax-payers to incur a heavier financial burden for encouraging manufactures made this the only measure possible.

Soon after the settlement of Pennsylvania, William Penn as governor, but probably out of his private purse, offered a premium for the first and finest piece of linen made in the province.[41] In 1693 Virginia passed a law directing the justices of the peace in each county to offer every year three rewards, not exceeding 800, 600, and 400 pounds of tobacco respectively, for the three best pieces of linen three-fourths of a yard wide and 15 ells long presented in competition.[42] A law was passed in Massachusetts in 1722, and continued by reënactment six years later, directing the justices to pay a double price for the three best pieces of linen made in each county from home-grown flax, when presented in pieces a yard wide and at least 20 yards long, and to sell back the linen either to the maker or the public at the market price. The justice drew from the colonial treasurer the difference between the price paid and the price received.[43] In 1740 Maryland, by a similar enactment, required each county to levy an annual tax of £30 colonial currency, which was to be divided into premiums of £6, £5, and lesser amounts, to be presented to the makers of the finest pieces of homespun linen not less than 20 yards long and 1 yard wide. The preamble of this act reads: "Whereas several inhabitants of this province, especially of the poorer sort, can not provide necessary clothing, particularly linen, for themselves and their families by the products of their crops of tobacco in the present low state of that commodity, and the making linen cloth of flax and hemp of the growth of the country would be of great advantage to the people thereof," which suggests that home weaving had possibly declined since the encouragements of half a century before.[44] In connection with the linen bounty act of 1722, Massachusetts provided that the colonial treasurer should pay a premium of 40 shillings each for the three best pieces of sailcloth, 30 inches wide, 36 yards long, and weighing 43 pounds to the bolt, manufactured in the province.[45]

These premium acts usually contained a provision that the pieces receiving a reward should be cut in two to prevent their being pre-

[40] Pennsylvania, *Statutes at Large*, III, 415.
[41] Bishop, *History of American Manufactures*, I, 316; Bagnall, *Textile Industries*, 9.
[42] Virginia, *Statutes at Large*, III, 121.
[43] Massachusetts, *Acts and Laws*, 1728, 297–298. A similar law was passed in Rhode Island.
[44] Maryland, *Acts of Assembly*, July 1740, 17–19.
[45] Massachusetts, *Acts and Resolves*, 1722, II, 241.

sented twice in competition. Premiums sometimes were offered for the first articles produced in the colony rather than for the best ones. Thus in 1712 South Carolina provided a reward of 40 shillings a ton for the first 500 tons of potash shipped out of the colony, and also £50 to each of the first two persons setting up potash works in the province.[46] In 1789 North Carolina, in an act stating that "it is the duty of the legislature by all convenient means to promote industry and useful manufactures," offered a premium of £20 to the person in each district making the largest quantity of potash within two years. The law states that the manufacture had not been carried on previously, indicating that the bounty act of 1773 was not a success.[47] In 1775, at the outbreak of the Revolution, North Carolina was one of the most energetic of the colonies in promoting home manufactures, and offered large premiums for the first or the best specimens of cards, linen, woolen, ironware, saltpeter, salt, gunpowder, and other articles of common use made in the State.[48] About the same time some counties, notably Essex County in Virginia and Bedford County in Pennsylvania, offered premiums to encourage local manufactures.[49] At an earlier date, in 1759, Virginia, in a general effort to promote manufactures and introduce new industries, adopted what was at that time a novel expedient in America, of establishing a public corporation to encourage arts and manufactures by means of premiums. The projectors probably had the London Society of Arts in mind, as that society had taken an interest in establishing silk culture and other new industries in America. The law, which was entitled, "An act for encouraging arts and manufactures," provided for trustees named in the act, of whom seven constituted a quorum, and for a salaried clerk. The trustees were to correspond with persons "who may give them any useful insight or intelligence in any art or manufacture," and were to grant prizes for new discoveries or the introduction of new industries. They were allowed to raise £1,000 for the latter purpose and for the pay of their clerk. The act was amended three years after its passage, providing among other things that specified premiums should be offered for wine and silk made in the province. Evidently the law was not a success, and there is reason to suppose that the trustees were not able to raise the sum mentioned by subscription.[50] But the act is suggestive as the probable forerunner of laws establishing the agricultural societies and similar associations that did not a little to foster interest in home manufactures during the early decades of the Republic.

Occasionally the public authorities in the colonies promised definite encouragement to persons proposing to establish a new industry, con-

[46] South Carolina, *Laws of the Province* (ed. Trott), 217.
[47] North Carolina, *Acts of Assembly* (ed. Iredell), 690.
[48] Bishop, *History of American Manufactures*, I, 382, 615–616.
[49] Bishop, *History of American Manufactures*, I, 381–382.
[50] Virginia, *Statutes at Large*, VII, 289, 563, 566; VIII, 364.

ditioned upon their manufacturing a certain quantity of the commodity or articles in question. Virginia promised Colonel Edmond Scarborough 10,000 pounds of tobacco if he would manufacture 800 bushels of salt in the province, a condition that he fulfilled, as in March 1660 the House of Burgesses ordered this subsidy levied and paid.[51] Twelve years previously the General Court of Massachusetts had pledged the government of that province to purchase at stated rates a specified amount of salt from works which the younger Winthrop was proposing to establish.[52] In 1701 the same colony passed a law subsidizing a company to the extent of a farthing a pound for all the hemp it purchased, subject to the condition that the company buy all "bright, well-cured, water-rotted hemp, 4 feet long," raised in the colony, for 4.25 pence a pound.[53] In 1719 New Hampshire passed an act directing the treasurer to buy merchantable hemp produced in that province at 12 pence a pound.[54] In 1722 Rhode Island granted William Borden, of Newport, upon his petition, 20 shillings for every bolt of duck he manufactured from local hemp, equal to good Holland duck.[55] The subsidy was to continue ten years and was confined to the petitioner. Again in 1727 Massachusetts, in extension of the general bounty of 20 shillings a bolt upon duck already established by the act of the previous year, granted to John Powell a subsidy of 30 shillings a bolt for ten years;[56] and six years later the same encouragement was given to Obediah Dickenson, of Hatfield, who was also manufacturing this article.[57] Duck bounties were retained in New England for some time after the Revolution.

LAND GRANTS, LOANS, AND LOTTERIES IN AID OF MANUFACTURES

Public lands were granted by the northern colonies to encourage new industries. Sometimes the land itself supplied the materials or the facilities employed in the manufacture, as in case of brick yards, glass and iron works, and where water-power was used. In other instances the land was given as a reward to the promoter rather than a direct aid in his undertaking, and was not donated until after the enterprise was successfully established. These grants were made either by the province or by the town authorities. The privilege of taking ore and fuel from common lands, analogous to our present mineral rights, was usually given by the provincial government, but did not convey a title to the land itself. Such a privilege, relating to

[51] Virginia, *Statutes at Large*, II, 38, 122, 186, 236.
[52] Massachusetts, *Records of the Governor and Company*, II, 229; quoted in Bishop, *History of American Manufactures*, I, 283.
[53] Massachusetts, *Acts and Resolves*, 1701–1702, I, 473.
[54] New Hampshire, *Acts and Laws* (ed. 1726), 143.
[55] Rhode Island, *Records*, IV, 317, 321.
[56] Massachusetts, *Acts and Resolves*, XI, Appendix VI, 52.
[57] Massachusetts, *Acts and Resolves*, XI, 724.

coal and iron, was granted in 1637 by Massachusetts to Abraham Shaw.[58] But in 1644 that colony gave the promoters of the Lynn iron works the right to select 3 square miles of land in each of six places they might choose.[59] This appears to have been a fee-simple grant. The same colony, in 1648, granted John Winthrop 3,000 acres of land upon condition that he set up salt works making 100 tons annually.[60] Three years later Connecticut favored Winthrop and his associates with a grant even more liberal than that of the sister colony, comprising "the lands, wood, timber, and water" within 2 or 3 miles of any mines they discovered and developed, providing these were not already occupied.[61] At a later period New Hampshire reserved a strip of land 2 miles in breadth, "above the head line of Dover," to provide fuel for iron works.[62] In 1735 Massachusetts, in connection with other encouragements, granted Thomas Plaisted 1,500 acres of land within 20 or 30 miles of Boston for making potash.[63] The land was surveyed and a patent confirmed the following year. As a reward for previous labors, the same colony, in 1733 and later, granted Joseph Mallinson, who was an iron-master at Duxbury as early as 1710, 200 acres of wild land, "in consideration of his great service to the public in setting up the manufacture of cast-ironware in sand."[64] In 1698 Massachusetts granted 300 acres of land to William Hubblefield, of Boston, "in consideration of his good services in promoting and instructing many persons in the trade and mystery of cloth-making."[65] North Carolina, in 1788, offered title to 5,000 acres of land to persons setting up successful iron works in that State.[66] As late as 1789 the Massachusetts legislature granted State lands to the value of £500 to the incorporators of the Beverly Cotton Factory, partly to reimburse them for their unusual expense in establishing that enterprise.

The New England townships—and this applies to parts of East Jersey settled by New Englanders—were originally associations of proprietors who jointly purchased or secured by a grant a tract of land upon which they settled. As in case of Plymouth and Rowley, the settlers might work the land in common for a time, but usually a part was allotted in severalty to the different proprietors, who retained common rights to the remainder. But although cultivated land was held individually, the common economic interests of the community continued many and active. Town meetings used their control over common lands to promote local industries. Town aid was granted

[58] Massachusetts, *Records of the Governor and Company*, I, 206.
[59] Massachusetts, *Records of the Governor and Company*, II, 61, 81, 103, 125.
[60] Massachusetts, *Records of the Governor and Company*, II, 229.
[61] Connecticut, *Public Records*, I, 223, May 1651.
[62] Belknap, *History of New Hampshire*, II, 29–31.
[63] Massachusetts, *Acts and Resolves*, 1735–36, 1st sess., Chap. 220; *id.*, 1736, 1st sess., Chap. 56.
[64] Massachusetts, *Acts and Resolves*, 1732–1733, 1st sess., Chap. 94; *id.*, 1739–1740, 4th sess., Chap. 92.
[65] Massachusetts, *Archives*, LIX, 234–236, XI, 689.
[66] North Carolina, *Acts of Assembly* (ed. Iredell), 644; Watkins, *Digest of the Laws of Georgia*, 203, 235; Marburg and Crawford, *Digest of the Laws of Georgia*, 318, 322.

in one of three ways: by alloting directly a tract of land, a water power, or right to use common land without ownership, to craftsmen and manufacturers; or by contributing directly to some manufacturing enterprise, such as the erection of a mill; or simply by admitting as freemen, a status which carried with it economic privileges, qualified mechanics who desired to settle within its jurisdiction. When Worcester was settled, in 1684, the township was divided into 480 lots, of which 80 were to be free of rates. These tax-free lots were mostly assigned for public or quasi-public purposes, such as the school, the public training-ground, the minister's residence, and the cemetery; but they included, apparently with the same legal privileges, lots for a gristmill, a sawmill, a fulling mill, and for other useful trades.[67]

Town aid to mills was very common. As early as 1635 Watertown assigned a lot for a gristmill;[68] in 1638 Portsmouth, Rhode Island, was negotiating with two parties who were to receive ground for setting up a water mill;[69] and five years later Boston granted 300 acres of land to the builders of a tide mill to grind corn. In 1665 Groton gave land for the same purpose, and in 1713 Rutland allowed 900 acres for the first mill built within its limits.[70] Sawmills were promoted by land grants—in 1683 at Woodbridge, New Jersey, and in 1736 at Keene, New Hampshire.[71] In 1704 the former town gave land for a fulling mill.[72] Ipswich still earlier had given a house lot to a clothier;[73] and in 1656 Chelmsford, the site of the present city of Lowell, granted 12 acres of meadow and an equal amount of upland to William How, "provided he set up his trade of weaving and perform the town's work."[74] In 1638 Salem gave, besides other assistance, several acres of land to the local glass house.[75] In 1644 Roxbury, and five years later Haverhill, gave land to brickmakers.[76] Ipswich and Gloucester gave similar aid to a salt works.[77] In 1643 the town of Braintree granted Winthrop and his partners 3,000 acres of land "for the encouragement of an iron work."[78] In 1677 Reading allotted land to a shoemaker, and in 1699 Newbury gave similar encouragement to a tanner.[79]

[67] Weeden, *Economic and Social History of New England*, I, 271, quoting Worcester, *Property Records*, III, 34.
[68] Weeden, *Economic and Social History of New England*, I, 103.
[69] Rhode Island, *Records*, I, 62.
[70] Bishop, *History of American Manufactures*, I, 126–127.
[71] Dally, *Woodbridge and Vicinity*, 93, quoted in New Jersey *Archives*, XII, 5; New Hampshire Historical Society, *Collections*, II, 76–77.
[72] Dally, *Woodbridge and Vicinity*, 146–147.
[73] Felt, *History of Ipswich, Essex and Hamilton*, 96; Weeden, *Economic and Social History of New England*, II, 514.
[74] Bagnall, *Textile Industries*, 8.
[75] Essex Institute, *Historical Collections*, XVI, 2.
[76] Drake, *The Town of Roxbury*, 68; Chase, *History of Haverhill*, 71; Weeden, *Economic and Social History of New England*, I, 181, 190.
[77] Felt, *History of Ipswich, Essex and Hamilton*, 98; Babson, *History of the Town of Gloucester*, 120.
[78] Savage, *Life of Winthrop*, II, 261.
[79] Coffin, *History of Newbury, Newburyport, and West Newbury*, 167; Bishop, *History of American Manufactures*, I, 435; *cf.* Coffin, *History of Newbury*, 43.

In the central and southern colonies this form of aid was not so common, partly because the land was not to the same extent at the disposition of the local authorities, and because settlement was not concentrated so as to support small tradesmen. In 1694 Maryland passed a special act applying to the port of Annapolis, providing among other things that tradesmen should have freemen's rights in the town, and that bakers, brewers, tanners, dyers, and other craftsmen should be assigned sites for following their trades in the town pasture.[80] In 1769 Virginia bought 100 acres of land near Williamsburgh, and provided a house and slaves, to assist a French vintager to introduce wine-making.[81] The plantation was to become the property of the vintager if he succeeded in making 10 hogsheads of good wine within 6 years. Evidently he failed, since the land was ordered sold, as unfit for a vineyard, 7 years later.[81] In 1737 South Carolina had established a plantation under a skilled director, on somewhat similar lines, to introduce silk-culture;[82] but in that case the land was leased and there was no provision that it should become the property of the director as a reward for his success. When the Palatines were brought to New York by the British Government, in 1710, for the purpose of manufacturing tar and other naval stores, land was provided for them.[83] But nowhere, except in New England, and especially in the New England towns, was it the usual policy to grant land for the purpose of promoting manufactures.

Lack of private capital and the inexperience of the colonists in collective capitalist undertakings caused the legislatures to foster, by public loans, new industries requiring a large investment. These loans were often without interest, but usually security was taken for their repayment. In earlier times, when few manufacturing enterprises were extensive enough to appeal to more than local support, such assistance was given by the New England towns. In 1638 Salem was asked by the General Court of Massachusetts to loan £30 to the glass men, and to deduct the amount from its next colony tax.[84] In 1685 the same town loaned John Wareing £5 to pay his spinners.[85] Towns often granted money for mills, but usually as a bonus instead of a loan. In 1645 Newbury gave £20, and in 1770 Woodbridge, New Jersey, gave £30 to the builder of its first gristmill. Keene, New Hampshire, in addition to land, gave £25 to its first sawmill. In 1722 Boston loaned £300 for seven years, upon personal security, "for carrying on spinning in this town."[86] In 1725 Rhode Island loaned

[80] Maryland, *Laws of the Province* (ed. Bradford), 15.
[81] Virginia, *Statutes at Large*, VIII, 364; VII, 239.
[82] South Carolina, *Session Laws*, 1733–1736, 206; *cf.* South Carolina, *Statutes at Large* (ed. Cooper), III, 437, 613.
[83] O'Callaghan, *Documentary History of the State of New York*, III, 386, 392; *cf.* Lord, *Industrial Experiments in the British Colonies*, 45.
[84] Massachusetts, *Records of the Governor and Company*, I, 344.
[85] Felt, *Annals of Salem*, II, 159.
[86] Bagnall, *Textile Industries*, 19.

William Borden £500, at interest and upon security, to assist him in establishing his sailcloth manufacture; and three years later the colony loaned the same undertaker £3,000 in bills of public credit, without interest but upon security, for this factory.[87] This loan was continued 18 years. As the colony paid no interest upon these bills, this was simply a device for liquidating Borden's other property through the medium of the public credit. About the same time Massachusetts made provision for loaning £5,000 to John Powell, who proposed to establish a sailcloth factory in Boston; but this was conditional upon the undertaker's maintaining an output ranging from 100 to 500 bolts of canvas per annum, and it is doubtful if that condition ever was fulfilled.[88] In 1735 the same colony, in addition to the land grant previously mentioned, loaned Joseph Plaisted £800, "to be repaid in small installments," to enable him to manufacture potash.[89] In 1753 Massachusetts granted £1,500 to encourage the manufacture of linen in the province; this was in the form of a carriage tax, the real proceeds of which were just under £739, and was an outright subsidy to a society, which erected the Manufactory House with the funds. But the building ultimately reverted to the colony and was let at a nominal rental to manufactures.[90] In 1786 the State loaned £200 to Robert and Alexander Barr, to enable them to complete models of the new machinery for carding, roping, and spinning wool and cotton. This loan appears to have been remitted, and the Barrs were given in addition six tickets in the State land lottery.[91]

Pennsylvania granted aid, either in the form of loans or of subscriptions, to societies and companies of manufacturers. In 1770 the colony gave £1,000 to the Philosophical Society to encourage silk-culture.[92] In 1786 the State loaned Whitehead Humphries £300, for five years, without interest but upon double security, to assist him in the manufacture of steel.[93] In 1788 it paid John Hague £100 for "introducing into this State a useful machine for carding cotton."[94] The following year the State took 100 shares, at a cost of £1,000, in the Philadelphia cotton factory.[94] The same year £200 of the public money was loaned John Hewson, without interest but upon sufficient security, to enable him to extend his calico-printing business.[94]

The custom then common of raising funds for public purposes by lotteries was used in the colonies to obtain money for establishing or fostering new industries. The more usual purpose of such grants, however, was to relieve manufacturers who had lost their property by fire or similar disasters. When the glass works at Germantown,

[87] Rhode Island, *Records*, IV, 363, 407, 455, 525.
[88] Massachusetts, *Acts and Resolves*, XI, Appendix VI, 241.
[89] Massachusetts, *Acts and Resolves*, XI, 1735–1736, 1st sess., Chap. 220; *id.*, 1736, 3d sess., Chap. 113 in XII, 221, 310.
[90] American Historical Association, *Collections*, I, 347–359; Bagnall, *Textile Industries*, 33–49.
[91] Bagnall, *Textile Industries*, 85–86; Bishop, *History of American Manufactures*, I, 398.
[92] Pennsylvania, *Statutes at Large*, X, 474; *cf.* Mease, *Picture of Philadelphia*, 79.
[93] Pennsylvania, *Statutes at Large*, XII, 235.
[94] Pennsylvania, *Statutes at Large*, XIII, 138, 239, 288.

Massachusetts, burned, in 1756, the legislature allowed the owners to raise £1,250 by a lottery.[95] In 1758 Rhode Island granted to H. Chapman, of Newport, a lottery, to compensate him for the loss of his distillery, soap house, cooper's shop, joiner's shop, and other property during the French war.[96] In 1772 the same colony granted a lottery to Griffin Green, whose forge at Coventry had been destroyed by fire.[97] Green had rebuilt his forge previously, but applied the funds to the conduct of his business. Two years later the colony granted Jeremiah Hopkins, of the same place, a lottery for $200, to enable him to equip a gun shop.[98] Lotteries for all purposes became less common after the Revolution. However, in1787, Connecticut allowed William Cundall to set up a lottery to promote his woolen factory.[99] The prizes were to equal the price of the tickets, less 3 per cent for expenses, but were payable in woolens manufactured by the undertaker. In 1790 the same State granted the Hartford woolen factory a lottery, the proceeds of which were to be used for new machinery.[100] It is probable that the prizes were, as in the preceding instance, payable in woolens made by the establishment. Two years later a duck manufacturer in the same State was assisted by a lottery.[101] About the same time North Carolina granted Emanuel Lutterloh a lottery, to raise money to bring into the State a number of foreigners, "who are artisans in various branches of business,"[102] and Georgia in 1798 authorized a lottery to aid a cotton factory.[103]

LEGAL-TENDER AND TAX LAWS

The legal-tender laws, by which some colonies made manufactures or materials used in manufactures current in payment of debts and taxes, though designed primarily to relieve the lack of money, were directed also to promoting industries. The Virginia statute of 1682, which made flax and hemp, washed wool, tar, and lumber legal tender for debts, was entitled "an Act for the advancement of manufactures the growth of the country."[104] The following year Pennsylvania, "to encourage flax and hemp," made them current for the payment

[95] Massachusetts, *Acts and Resolves*, 1756–1757, III, 1053–1054.

[96] Rhode Island, *Proceedings of Assembly*, Aug. 1758, 746; *Acts and Resolves*, Aug. 1758, 46–47.

[97] Rhode Island, *Records*, VII, 243; Rhode Island, *Acts and Resolves*, May 1774, 17; June, 31.

[98] Rhode Island, *Records*, VII, 271.

[99] Bagnall, *Textile Industries*, 87.

[100] Bagnall, *Textile Industries*, 103–105; letter of Elisha Colt, Aug. 20, 1791, in *Hamilton Papers*. Also a subsidy of 1 d. a pound was ordered paid on yarn spun at this manufactory; Connecticut, *Acts and Laws*, May, 1788, 361.

[101] Bagnall, *Textile Industries*, 88.

[102] North Carolina, *Acts of Assembly* (ed. Iredell), 644. A copy of the broadside issued by Emanuel Lutterloh is among the *Hamilton Papers* in the Congressional Library.

[103] Watkins, *Digest of the Laws of Georgia*, 684; Marburg and Crawford, *Digest of the Laws of Georgia*, 377.

[104] Virginia, *Statutes at Large*, II, 506.

of debts, the former at 8 pence a pound and the latter at 4 pence. Though the law was abrogated by Great Britain ten years later, it was renewed in 1700, but without fixing the price at which the commodities should be received.[105] In 1706 Maryland passed a similar law, making hemp and flax payable for one-fourth of any money or tobacco debt, flax at 9 pence a pound and hemp at 6 pence, when tendered at a market town.[106] In 1724 the law was amended to allow tender at the house of the creditor or his agent; and with some modifications it remained on the statue books until nearly the close of the colonial period.[107] In 1674 Rhode Island made wool, at 12 pence a pound, the standard commodity by which rates were assessed and estates settled; but the object was merely to regulate barter ratios by the most stable article, as wool had a comparatively fixed money price and was a common product of the Narragansett grazing farms.[108] In 1721, about the time it gave a bounty on flax and hemp and encouraged the manufacture of sailcloth, the same colony ordered its treasurer to receive the former for taxes at 10 pence and 8 pence a pound respectively.[109] At various times Massachusetts and New Hampshire made flax and hemp, tar, turpentine, leather, and oil receivable for taxes. During the latter half of the seventeenth century Virginia passed several laws levying a poll tax in kind, payable in flax and hemp, in order to compel their cultivation.[110]

In colonial as well as in later times many laws were enacted exempting both manufactures and materials for manufacture from taxation. At a very early period most of the New England colonies either made sheep free of taxes or rated them at an arbitrary low assessment.[111] In 1666 Connecticut levied no taxes on ships still on the stocks.[112] Three years later the same colony freed the iron works at New Haven from taxation for seven years.[113] In 1769 the Evesham and Hibernia iron works, in New Jersey, appear to have received the same favor.[114] In 1788 North Carolina exempted lands donated to ironmakers from all taxes for ten years from the time the grant was confirmed.[115] The same year Connecticut passed a law freeing from

[105] Pennsylvania, *Statutes at Large*, I, 140, 229.
[106] Maryland, *Acts of Assembly* (London, 1723), 55–56.
[107] Maryland, *Laws* (ed. Bacon), 1724, Chap. XXII.
[108] Weeden, *Economic and Social History of New England*, I, 327.
[109] Rhode Island, *Acts and Laws*, 1730, 119.
[110] *E. g.*, Weeden, *Economic and Social History of New England*, II, 479; Belknap, *History of New Hampshire*, II, 31; Virginia, *Statutes at Large*, II, 26.
[111] *E. g.*, New Hampshire, *Acts and Laws*, 138; Connecticut, *Acts and Laws*, May 1786; *Grants, Concessions, and Original Concessions of the Province of New Jersey*, 345.
[112] Connecticut, *Public Records*, II, 38, May 1666; Bishop, *History of American Manufactures*, I, 49.
[113] Connecticut, *Public Records*, II, 108, May 1669; Weeden, *Economic and Social History of New England*, I, 307.
[114] New Jersey, *Acts of Assembly* (ed. Allison), 319, 338.
[115] North Carolina, *Acts of Assembly* (ed. Iredell), 644.

taxes, during the pleasure of the assembly, all iron manufactories except slitting mills.[116] The New England towns not infrequently freed new mills from town rates for a certain period, or provided tax-free mill lots in the original apportionment of town lands.[117] In 1788 Connecticut exempted from taxation the Hartford woolen mills; and during the previous and succeeding years New Hampshire, in an effort to encourage manufactures, adopted a general policy of freeing from taxes all oil mills, rod and nail works, and sailcloth factories established within its jurisdiction.[118]

Mechanics and factory laborers frequently were relieved of personal taxes and public services. Some of the southern colonies, especially Virginia, made special efforts to induce artisans to settle and to ply their trades within their boundaries. In 1661 the latter colony freed from taxes artificers who did not plant tobacco.[119] The various acts for settling towns in Virginia, Maryland, and South Carolina usually exempted mechanics and manufacturers from taxation. In 1786 Virginia offered mechanics migrating to the State, and following their trades there, freedom for five years from all public burdens except the land tax.[120] As early as 1686 there is recorded what is probably not an isolated instance of a similar privilege in Connecticut, where the General Court allowed Francis Thrasher and his servant "freedom from training and working at highways" so long as they followed their employment of making cloth and serge.[121] In 1751 Rhode Island exempted "clothiers, fullers, weavers, and artificers" from taxes and public service for seven years.[122] In New Jersey, Maryland, and Virginia mechanics and laborers employed at iron works usually were freed from militia duty and the road tax; and during the Revolution the same privilege was sometimes accorded employees at salt works and paper mills.[123]

These exemptions were special favors, as all property, including mills and manufactories, ordinarily was taxed. As early as 1682 the mills of Massachusetts were made subject to a special levy for the protection of the frontier.[124] The New Jersey tax act of 1769 contains a schedule for manufacturing establishments, with taxes ranging

[116] Connecticut, *Acts and Laws*, May 1788, 361.

[117] *E. g.*, Coffin, *History of Newbury, Newburyport, and West Newbury*, 43.

[118] Connecticut, *Acts and Laws*, May 1788, 361; New Hampshire, *Acts and Laws*, 1789, 394, 453, 481, 551; New Hampshire, *Perpetual Laws, 1776–1789*, 196, 201, 205, 206.

[119] Virginia, *Statutes at Large*, II, 85, 179, 307; *cf.* also *id.*, II, 476–477.

[120] Virginia, *Statutes at Large*, XII, 262.

[121] Connecticut, *Public Records*, III, 196, May 1686.

[122] Rhode Island, *Acts and Resolves*, April 1751, 80–81.

[123] New Haven, *Colonial Records*, II, 173; Connecticut, *Public Records*, 1678–1689, II, 37–108; New Jersey, *Acts of Assembly* (ed. Allison), 319–338; New Jersey, *Acts of Assembly* (ed Wilson), 6, 17, 20, 29, 33, 34, 53, 76; Maryland, *Abridgment and Collection of Acts of Assembly* (ed. Bisset), 130–131; Virginia, *Statutes at Large*, IV, 228, 296; VI, 137; IX, 593; X, 397, 425. Iron workers in Lorraine were freed from taxes and military service as early as 1580; Weyhmann, *Geschichte der Aelteren Lothringischen Eisenindustrie*, 95.

[124] Maine, *Historical Collections;* Bishop, *History of American Manufactures*, I, 129.

from 5 shillings to £30, applying to sawmills, gristmills, fulling mills, furnaces, forges, and bloomeries "that make iron directly out of the ore," distilleries and breweries, and glass houses, the last the most heavily taxed of any establishments except furnaces.[125]

MONOPOLIES AND PATENTS

Our patent law has evolved from the special monopolies established by colonial legislatures to protect new industries, and these in turn were based on the still earlier practice of the mother country. In colonial times this legislation was not specialized to foster new inventions, but like the British laws was used to encourage also the introduction of manufactures and processes from other countries, or to assist a single manufacturer to engage in a familiar industry, or to facilitate inspection and put an article of trade under the control of a particular seaport. The theory was that such monopolies or patents were proper whenever they caused a useful enterprise to start up where otherwise it would be neglected. In their wider application they were justified more easily in colonial times than they would be today, because the small population and the remoteness of the colonies from other countries limited the market afforded to local manufacturers and made ever imminent the danger of an overstock of the articles they produced.

But our early legislators maintained a discriminating attitude in regard to these privileges. Remembering the evils of monopolies established through favoritism, such as had been a great abuse in England until after the reign of Elizabeth, the fundamental laws of Massachusetts and Connecticut prohibited them in nearly identical words. In 1641 the legislators of the former colony decreed: "There shall be no monopolies granted or allowed among us, but of such new inventions as are profitable to the country, and that for a short time."[126] The Dutch both abused monopolies and discountenanced them. In refusing monopolies for potash, tile, and salt works in New Amsterdam, the authorities of the West India Company observed: "The grants we not only entirely disapprove, but require that you will not give one single grant more hereafter, as it is in our opinion a very pernicious management, principally so in a new and budding State, whose population and welfare can not be promoted but through general benefits and privileges, in which every one who might be inclined to settle in such a country, either as a merchant or a mechanic, may participate."[127] The patroons, it is true, possessed exclusive milling and brewing rights on their estates, which were partly in the nature of

[125] New Jersey, *Acts of Assembly* (ed. Allison), 319.

[126] *Book of the General Laws and Liberties*, in Massachusetts, *Colonial Laws*, 244; *id.*, 119 Connecticut, *Book of General Laws*, 52.

[127] Munsell, *Annals of Albany*, IV, 88, quoting *Albany Records*, IV, 99.

feudal privileges transferred from Europe; but as these seem to have resulted from the obligation to maintain mills and breweries imposed on the proprietors, they did not differ in principle from similar privileges granted by the townships and colonies of New England.[128]

Only patent monopolies granted to original inventors have survived as a familiar feature of modern legislation. The first patent issued in America for a mechanical invention was given, in 1646, by the colony of Massachusetts to Joseph Jenks, for improved sawmills and scythes.[129] The patentee had the exclusive right to manufacture and use his improvements for fourteen years, with the important reservation that "power is still left to restrain ye exportation of such manufactures, and to moderate ye prizes thereof if occasion so require." Jenks's improvement of the scythe was the first of the long series of inventions relating to agricultural machinery made in America, and created the modern scythe, with its long, narrow blade and thickened back, from the short, flat, bush-hook implement hitherto used and still found in some backward countries. Another feature of these inventions, later characteristic in America, was that they included machines for making the new implements as well as the implements themselves. Improvements in sawmills indicate that scant labor and abundant raw materials already directed attention in the colonies to the substitution of natural forces for manual effort. But in general colonial patents were distinguished from those of a later period by being for processes rather than for machinery.[130] With the exception of a theodolite, patented in 1735 for seven years,[131] by Rowland Houghton, of Boston, there appears not to have been a single mechanical device so protected in New England, from the time of Jenks to the Revolution. In 1652 Virginia granted to George Fletcher a monopoly of distilling and brewing with wooden vessels, "of which none have experience but himself," but the nature and the originality of this improvement are doubtful.[132] Unless we include this case, South Carolina alone gave patent protection to new machinery during the last century of colonial history. In 1691 the province enacted what may have been the first general patent law in America, "for the better encouragement of the making of engines for the propagating the staples of this colony."[133] In 1732 and 1733, by special acts, it granted rewards accompanied by patent rights to three inventors of rice-cleaning machinery, and in 1756 gave like protection to a similar inventor.[134]

[128] *Freedoms and Exemptions*, 1629, in New Netherlands, *Laws and Ordinances*, 3; *cf.* Massachusetts, *Acts and Resolves*, VIII, 306.

[129] Massachusetts, *Archives*, IV, 234–236; Massachusetts, *Records of the Governor and Company*, II, 149.

[130] *Cf.*, however, Massachusetts, *Archives*, LIX, Aug. 1652, for warming houses. Also Massachusetts, *Records of the Governor and Company*, III, 283.

[131] Massachusetts, *Acts and Resolves*, 1735–1736, II, 788.

[132] Virginia, *Statutes at Large*, I, 379.

[133] South Carolina, *Laws of the Province* (ed. Trott), 21.

[134] South Carolina, *Temporary Acts*, 33, 35; South Carolina, *Public Laws* (ed. Grimké), XLV.

In 1765 a patent was granted to John Cuthbert "for certain implements for the better cultivation of rice and other grain."[135] After the Revolution, mechanical improvements received more public attention in all the colonies. In 1784 South Carolina revived its old policy of affording general protection to inventions by "an act for the encouragement of arts and sciences," which contained a provision that inventors of useful machines should have the exclusive privilege of making and vending their devices for fourteen years.[136] In a special law passed two years later to protect the rights of an inventor in certain pumping and other power machinery, his privileges were conditioned upon his depositing a model of this mechanism with the Secretary of State, and not refusing to build on application, and not charging excessive prices.[137] It will be noted that the last two requirements never have been included in our Federal patent legislation. Fitch and Rumsey were allowed patents for steamboats by several States, and in 1787 the important improvements made by Oliver Evans in mill machinery were similarly protected. Among the inventions of this period were improvements in steam engines and other motors, made by James Rumsey, which were patented in Pennsylvania in 1789;[138] and additional improvements in the steam engine, making it "more powerful in its operation and more simple in its construction," for which patents were issued to Isaac Briggs and William Longstreet, probably of Augusta, Georgia, by that State and by South Carolina, in 1788 and 1786 respectively.[139] Mechanical inventions received relatively less legislative protection during the colonial period than later because tools rather than machinery were used for manufacturing, and power was employed in but few industries. Improvements in both tools and mills probably were not unusual, but they were unimportant individually, though in the aggregate they formed an important feature of industrial progress.

The day of patent medicines had not arrived, but proprietary compounds for other purposes occasionally were protected by law. Thus in 1716 South Carolina gave Dr. William Cook the sole right to prepare and vend "a certain compound of his own invention," composed of oil of tar and other ingredients, which preserved planks from rotting and protected the bottoms of vessels from the river worm.[140] In 1780 both New York and Pennsylvania granted a New Jersey petitioner a five-year patent for a currier's oil, the latter State requiring that the patentee publish his recipe in English and German, in order that others

[135] South Carolina, *Public Laws* (ed. Grimké), 1.
[136] South Carolina, *Session Laws*, 1784, 49; South Carolina, *Statutes* (ed. Cooper), IV, 618, No. 1221, § IV.
[137] South Carolina, *Session Laws*, 1786, 63; South Carolina, *Statutes* (ed. Cooper), IV, 755.
[138] Pennsylvania, *Statutes at Large*, XIII, 363.
[139] South Carolina, *Statutes* (ed. Cooper), V, 71; Warkins, *Digest of the Laws of Georgia*, 382.
[140] South Carolina, *Laws of the Province* (ed. Trott), 297.

might avail themselves of it after the patent had expired.[141] In 1750 Massachusetts made a similar condition in granting a ten-year patent to a manufacturer of sperm candles and other whale products, requiring him to teach at least five apprentices during that period, of whom two should be nominated by the General Court.[142] In 1717, Connecticut conditioned a monopoly of making molasses from cornstalks upon the petitioners producing "as good molasses and as cheap as comes from the West Indies."[143] Among patents for processes was one given by the same colony eleven years later, allowing two grantees the sole right to manufacture steel from iron by a method discovered and put in practice by themselves.[144]

Many attempts were made to promote the manufacture of salt by monopolies. In 1641 Massachusetts granted Samuel Winslow such a privilege for ten years, conditioned upon his setting up works within a year.[145] He was to make salt by a new method, which probably meant one not hitherto practiced in the province. Fifteen years later the General Court granted John Winthrop a monopoly of manufacturing salt, "after his new way," for the unusual period of twenty-one years.[146] In 1691 Connecticut offered a monopoly of salt-making to any person who would set up the first works.[147] Massachusetts again, in 1696, allowed certain Boston merchants a fourteen-year patent for making salt "after the manner as it is made in France."[148] In 1660 Virginia, in 1725 South Carolina, and in 1746 Connecticut again, protected new salt works with a similar privilege.[149] Not only in case of salt was the introduction of an improved process or machine from a foreign country esteemed to justify giving a patent to the introducer. In 1731 Rhode Island gave John Lucena, who was naturalized the same year, sole right to manufacture castile soap in the colony, a business he had learned in the manufactory of the King of Portugal.[150] Similarly, in 1753, Connecticut gave Elihu Chauncey, of New Haven, a fifteen-year monopoly of the use of a flax machine, which it was stated had already been for some time in practical service in Scotland and Ireland.[151] The privilege was given subject to the condition that within five years the patentee should set up a machine in every town where he desired to maintain this privilege.

The most numerous monopolies were those designed to protect

[141] New York, *Laws*, I, 277; Pennsylvania, *Statutes at Large*, 131.
[142] Massachusetts, *Acts and Resolves*, III, 546–547.
[143] Connecticut, *Public Records*, VI, 26, Oct. 1717.
[144] Connecticut *Public Records*, VII, 174, May 1728.
[145] Bishop, *History of American Manufactures*, I, 282.
[146] Massachusetts, *Archives*, LIX, 72; Bishop, *History of American Manufactures*, I, 284.
[147] Connecticut, *Public Records*, IV, 43–44, May 1691.
[148] Massachusetts, *Acts and Laws* (ed. 1726), 77.
[149] Virginia, *Statutes at Large*, II, 186; South Carolina, *Laws of the Province* (ed. Trott), 428; Connecticut, *Public Records*, IX, 246–247, Oct. 1746.
[150] Rhode Island, *Acts and Resolves*, Feb. sess., 1761.
[151] Connecticut *Acts and Laws*, Oct. sess., 1753; Bagnall, *Textile Industries* 50–51.

the local market for an intending manufacturer, without regard to inventions or imported methods; but as the projected industry was usually a new one or one fallen into abeyance, the grantee in most cases might claim credit for introducing his art from another country or province. Mills not infrequently were assured such privileges. In 1643 Boston, which a quarter of a century later gave a monopoly for a dry-dock, offered the exclusive right of grinding corn for the public to the builders of a tide mill.[152] In 1712 South Carolina promised an eight-year monopoly for the first sawmill built in the province, and a five-year monopoly for the first grain mill. The person setting up a tobacco-pipe factory was to have the sole right to manufacture for eight years.[153] In 1671 Massachusetts gave a company of Boston merchants, in addition to timber rights for making tar, the sole right to make and sell pitch, rosin, and oil of turpentine and mastick within the colony. The company must sell its products at reasonable rates, and pay a tax of 6 per cent upon all the pitch and rosin manufactured.[154] In 1708 Connecticut granted John Eliott, of Windsor, who undertook "to make pitch in considerable quantities," the sole right to manufacture for sale in that province.[155] Among other enterprises that received similar encouragement were duck factories in Connecticut in 1725,[156] and in Massachusetts the following year,[157] linseed oil mills in New York in 1712,[158] and in Connecticut in 1718;[159] and potash works in the latter colony in 1741,[160] and in Rhode Island in 1753.[161] The next year the latter colony granted a separate patent for making pearl ashes. In 1728 Massachusetts gave the Dorchester paper mill the sole right to make paper in the province for ten years, as the undertaking would require a large investment before yielding returns,[162] and in 1737 it granted a monopoly of making oil in Hampshire County to the builders of a mill at Hatfield.[163] Five years later the colony gave certain Charlestown promoters the sole right to make stoneware, declaring establishments set up without their consent common nuisances.[164] Besides the previous monopolies mentioned, Connecticut in 1722 and 1747 gave like privileges to a slitting mill,[165] and in 1747 to a glass factory.[166] New York

[152] Massachusetts, *Acts and Resolves*, VIII, 306.
[153] South Carolina, *Laws of the Province* (ed. Trott), 217; South Carolina, *Statutes*, 1707, II, 307; *cf.*, however, Trott, 153.
[154] Lord, *Industrial Experiments in the British Colonies*, 22, citing *Board of Trade, New England Entry Book A*, Sept. 10, 1697.
[155] Connecticut, *Public Records*, V, 46, May 1708.
[156] Connecticut, *Public Records*, VI, 572, Oct. 1725.
[157] Massachusetts, *Archives*, LIX, 251.
[158] New York, *Colonial Laws*, I, 752; *cf.* also *id.*, 339.
[159] Connecticut, *Public Records*, VI, 79–80, Oct. 1718.
[160] Connecticut, *Public Records*, VIII, 395–396, May 1741.
[161] Rhode Island, *Records*, V, 375–376.
[162] Massachusetts, *Acts and Resolves*, II, 518–519.
[163] Massachusetts, *Acts and Resolves*, II, 920–921.
[164] Massachusetts, *Acts and Resolves*, III, 41–42; Massachusetts, *Temporary Acts and Laws* (ed. 1742), 68.
[165] Connecticut, *Public Records*, VI, 312, May 1722; IX, 329, Oct. 1747.
[166] Connecticut, *Public Records*, IX, 281–282, May 1747.

granted similar favors, in 1712 to a maker of lampblack,[167] and eight years later to a sugar refiner.[168]

These monopolies to encourage manufactures are by no means an index to the number of new establishments successfully started or to the progress in processes and mechanical devices. In many cases encouragements were promised to what proved in the event abortive efforts to introduce an industry. On the other hand, new establishments sprang up and new methods of manufacture were introduced without legislative protection. Several colonies, notably Pennsylvania, the chief seat of colonial manufactures in the eighteenth century, gave no such assistance to inventors and promotors until after the Revolution.

New York appears to have been the only colony where monopolies were used as subsidiary to the inspection laws, to assure standard products. This is probably the explanation of the tanning monopoly in New York City granted in 1676 by Governor Andros to two tanners, for it was given at the same time that laws were passed regulating the industry.[169] A more important monopoly of the same character was the bolting act. This measure, likewise, was first adopted by Andros, who in 1678 prohibited the manufacture or bolting of flour at any place in the province except New York City, or the importation of flour from the province into the city, under penalty of forfeiture. In 1684 the assembly embodied these provisions in a statute.[170] The act continued in operation six years longer, and its repeal brought about a serious commercial crisis in the city. As late as 1698 New York petitioners asserted that, as a result of the deterioration of the flour of the province by adulteration after the abolition of the monopoly, "the price and value of New York flower fell five shillings in the hundred below the price of Pennsylvania and other flower, at Barbadoes and the Sugar Islands."[171]

The temporary and local effect of monopolies may have been at times considerable, but their permanent and general influence upon colonial manufactures might almost be disregarded. Their common use, in New England especially, to encourage new industries appears to have been due to an acquired habit of legislation rather than to successful experience. The policy of creating industrial monopolies for the purpose of establishing new manufactures died out in England about the time of the Restoration.[172] Its tardier disappearance in the colonies was due to different conditions there prevailing, and especially to the exigent need at times felt for that regular and reliable supply of an

[167] New York; *Colonial Laws*, I, 755, 995; II, 242.
[168] New York, *Colonial Laws*, II, 7, 417.
[169] Bishop, *History of American Manufactures*, I, 440.
[170] Bishop, *History of American Manufactures*, I, 441; New York, *Colonial Laws*, I, 218; *cf.* also O'Callaghan, *Documents Relative to the Colonial History of New York*, III, 38; IV, 223.
[171] O'Callaghan, *Documents Relative to the Colonial History of New York*, IV, 461.
[172] Cunningham, *Growth of English Industry, Modern Times*, I, 205, 324.

article of large consumption, that in those days of uncertain commerce only home establishments could afford. After 1750 we hear less of this method of promoting industries.

Exclusive privileges continued to be granted to inventors; but these later laws mark the transition from the monopolies of an earlier date to the patent rights which play so important a part in modern legislation affecting manufactures. The causes that have made America a favorable field for inventions, both those originating in the country and those brought from abroad, already were noted before the adoption of the constitution. A French observer said about 1789: "The farmer and the artisan have more to do than they can perform; scarcity of men makes labor very dear; to supply the want of labor and time the American is forced to invent, to think out new ways of augmenting his efficiency."[173]

EXPORT REGULATIONS AND TARIFFS

Most of the colonies prohibited certain exports, in order to assure themselves materials for local manufactures. Less commonly export duties were imposed, partly for the same purpose. The prohibitions related particularly to hides and leather, though they also were applied to wool, iron, lumber, naval stores, and a few minor commodities. The exportation of hides was forbidden in order to promote tanning, and the exportation of leather in order to encourage shoemaking and other manufactures of this material. Before 1690 Virginia passed at least seven laws to prevent the shipment of hides from the colony. The first act, in 1631, was amended the next year, increasing its penalty to three times the value of the property exported, indicating that the legislature attached importance to its enforcement.[174] It was renewed in 1645 with a preamble expressing the desire "that all manufactures should be set at work and encouraged in this colony," and was extended to include leather.[175] Though it was repealed the following year, in 1661 a new act raised the penalty for exporting a hide to 1,000 pounds of tobacco, and by an amendment the following year made this penalty applicable to the seller as well as the buyer.[175] One year later, it having been found that deer and calf skins were also useful "for promoting the manufacture of shoes," these were included in the previous prohibitions.[175] The law was repealed in 1671, but again reënacted in 1682.

In 1646 Massachusetts Bay, and in 1658 Plymouth, forbade the exportation of raw hides.[176] The law was on the statute books of the former colony a quarter of a century later. In 1700 the General Court

[173] Crèvecœur, *Lettres d'un Cultivateur Américain*, III, 446.
[174] Virginia, *Statutes at Large*, I, 174, 199.
[175] Virginia, *Statutes at Large*, I, 307; *id.*, II, 124–125, 179; *id.*, 185.
[176] Massachusetts, *Colonial Laws*, 63–64, New Plymouth, *Compact, Charter and Laws*, 119.

prohibited shipping raw hides, upper leather, or tanned calf out of the colony, except to England.[177] In 1657 Connecticut forbade hide exports, and five years later New Haven Colony forbade the shipment of both hides and leather, except that the latter might be exchanged for hides abroad.[178] In 1678 Connecticut also adopted the latter provision. The law was enforced, for in 1707 the colony granted a special permit to a Milford tanner to export an accumulated stock of leather.[179] In 1685 and 1712 Maryland passed acts similar to those of her sister colonies, because exporting hides injured tanners and shoemakers and deprived the people of materials for clothing.[180] The law was in force, so far as it related to leather, in 1759.[181] In 1678 New Jersey passed similar legislation.[182] New York in 1717,[183] and North Carolina in 1748—and even so late as 1789—forbade the exportation of hides.[184] In 1700 Pennsylvania made it illegal to ship leather from the colony when the price equaled or exceeded 8 pence a pound, and four years later, at the petition of artisans working in leather, forbade its exportation altogether.[185]

The scarcity of iron and wool in the colonies caused laws forbidding their exportation. The charter of the Lynn Company provided, apparently as a special privilege, that it should have the right to sell its surplus iron outside the colony, except to enemies.[186] Some of the Virginia laws prohibited the export of iron and wool as well as hides. When the act of 1661 was repealed, ten years later, it was because it had not answered the hope "that tanners, weavers and smiths would have been encouraged."[187] A similar law was on the Maryland books from 1663 until nearly the close of the century, but was enforced with some difficulty; for when, about 1686, complaint was brought against the brigantine *Mayflower*, of Boston, for having iron and wool for export aboard, the informer was mobbed.[188] New Hampshire in 1719 forbade the exportation of iron ore, in order to aid a company that had raised capital to erect furnaces in the colony.[189] In 1675 Massa-

[177] Massachusetts, *Acts and Resolves*, I, 431–432.

[178] Connecticut, *Book of General Laws*, 39; Massachusetts, *Acts and Laws*, 1715, 66; Connecticut, *Public Records*, I, 298, May, 1657.

[179] Connecticut, *Public Records*, V, 18, Apr. 1707.

[180] Maryland, *Archives, Proceedings of Assembly*, VII, 206; XIII, 496; Maryland, *Laws of the Province* (ed. Bradford), 63; Maryland, *Acts of Assembly* (London, 1723), 66.

[181] Maryland, *Abridgment and Collection Acts of Assembly* (ed. Bisset), 40.

[182] New Jersey, *Grants, Concessions, and Original Constitutions*, 129, 135.

[183] New York, *Colonial Laws*, I, 991.

[184] North Carolina, *Acts of Assembly* (ed. Swann), 259; North Carolina, *Acts of Assembly* (ed. Iredell), 668.

[185] Bishop, *History of American Manufactures*, I, 445.

[186] Massachusetts, *Records of the Governor and Company*, II, 81, 103, 125.

[187] Virginia, *Statutes at Large*, Act of 1657, I, 488; repeal as to iron and hides, I, 525; Act of 1661, II, 124, 179; repeal, II, 287; reënacted for wool in 1682, II, 493.

[188] Maryland, *Archives, Proceedings of Assembly*, I, 495; XIII, 223, 496; mob incident, petition, Sept. 8, 1686; Maryland *Archives, Proceedings of Council*, V, 492.

[189] New Hampshire, *Acts and Laws*, 139.

chusetts forbade the exportation of wool and raccoon furs, the preamble of the act mentioning "the usefulness of raccoon furs for making a good sort of hats for the supply of the country."[190] After Parliament forbade the colonies to ship abroad their wool, in 1699, further legislation relating to this commodity was unnecessary.

Export duties were designed partly to foster home industries, and usually applied to the same articles that at other times or in other colonies were forbidden exportation. More than half these duties affected leather and hides, and take the place of the earlier prohibitory laws. Thus in 1693—following an act two years earlier that had not been put into operation—Virginia laid a duty of 3 pence on each hide exported and 6 pence on leather.[191] In 1765 the colony remitted the duty on leather made of imported hides, when shipped out of the province, because "the manufacture of leather hath of late years very greatly increased in this colony and become a considerable article of commerce."[192] In 1722 South Carolina laid duties on both leather and hides exported,[193] and in 1764 North Carolina,[194] and nine years later Georgia, imposed duties on hides alone except when shipped to Great Britain. The preamble of the Georgia act states that "the exportation of raw neat hides from this province tends to discourage industrious tradesmen and laborers."[195] Before Pennsylvania, at the solicitation of its shoemakers and other leather workers, in 1704 prohibited the exportation of leather, it had, in 1685, levied a duty on hides shipped elsewhere than to England, and in 1700 had laid a general export duty on raw hides and tanned leather without regard to their destination.[196] Therefore, while in Virginia and the other colonies the course of this legislation indicated that tanning extended faster than secondary leather manufactures, so that the duties were regulated primarily to protect that industry, in Pennsylvania, with its rapid industrial development, secondary manufactures outstripped the supply of raw materials.

Other export duties are relatively unimportant as relating to the history of manufactures. In 1661 Plymouth Colony levied a duty on tar, in line with other legislation to protect the diminishing timber resources of the colony;[197] and in 1780 Maryland imposed a tax on iron shipped from the State.[198] Several of the colonies taxed lumber ex-

[190] Massachusetts, *Colonial Laws*, 219, 220.
[191] Virginia, *Statutes at Large*, III, 63; Bruce, *Econonic History of Virginia in the 17th Century*, II, 483.
[192] Virginia, *Statutes at Large*, VIII, 142.
[193] South Carolina, *Laws of the Province* (ed. Trott), 94, 106.
[194] North Carolina, *Acts of Assembly* (ed. Davis), 314.
[195] Georgia, *Acts of Assembly*, 352.
[196] Pennsylvania, *Statutes at Large*, I, 138; II, 90–91.
[197] New Plymouth, *Compact, Charter and Laws*, 134.
[198] Bishop, *History of American Manufactures*, I, 590.

ports. New Jersey passed such a law in 1713, and Connecticut a year later, not only to protect their timber resources, but also to divert trade from New York.[199] Both these acts remained in force about half a century, and the duties applied only to lumber shipped to the neighboring colonies, the purpose being to promote direct trade to the West Indies and Wine Islands rather than to increase the manufacture of lumber within the province. However, in reporting a New Jersey act levying a duty on wheat, meal, and cooperage stock, in 1725, Governor Burnet said that its purpose was "to encourage manufacture of the grain and timber of the province among themselves, so that the wheat may be ground and bolted before it is exported, and the casks of different sizes made within the province."[200] With the few exceptions noted, this was the first purpose of all the export duties and prohibitions enacted by the colonies.

IMPORT DUTIES AND TONNAGE LAWS

Colonial duties, especially upon foreign and English goods, were in the main designed for revenue, and their incidentally protective influence on American manufactures is suggested chiefly by the opposition they aroused in Great Britain. Massachusetts and New York, and in one instance South Carolina, imposed duties against the mother country. They were discontinued about 1720, and prohibited four years later, so that their influence is confined to the earlier period.[201] Occasionally both before and after that date different colonies laid import taxes on liquors, slaves, sugar and tropical products, and European goods not imported from Great Britain; and during and after the Revolution general duties were imposed for revenue purposes. The first real protective tariffs upon European wares date from 1785.

Early New England enjoyed practically free trade with the mother country, but the right of the colonies to levy duties upon imports was assumed;[202] in the charter of Maryland it was specifically granted, apparently, even when the goods thus taxed were the product of the British Islands.[203] In New Netherlands duties on all imported merchandise, with some exemptions, were collected during the Dutch

[199] New Jersey, *Acts of Assembly* (ed. Neville), I, 15; II, 264; Connecticut, *Acts and Laws* (ed. 1718), 193, 201; *id.* (ed. 1750), 238; *id.* (ed. 1769), 238; *id.* (ed. 1784), 245.

[200] Governor Burnet to the Lords of Trade, Nov. 24, 1725, in O'Callaghan, *Documents Relative to the Colonial History of New York*, V, 767.

[201] By Orders in Council, Aug. 30, 1724; "Board of Trade, Plantations General," No. 10, *L*, 53, in O'Callaghan, *Documents Relative to the Colonial History of New York*, V, 706. *Cf.* Public Record Office, *Colonial Office Papers*, class 324, No. 12, *ff.* 165–177, in *British Transcript*, Library of Congress.

[202] Essex Institute, *Historical Collections*, I, 70; New Netherlands, *Laws and Ordinances*, 126.

[203] Charter, §XXII, in Maryland, *Laws* (ed. Bacon).

rule, and it was probably this precedent that caused the province to continue the same fiscal policy after the English occupation.[204]

The early Massachusetts duties varied on different commodities, seldom exceeding 5 per cent.[205] Upon English goods and general merchandise they were regarded as essentially identical with the regular property tax, which was more conveniently collected when the goods entered the country than afterwards. Thus in 1669 Massachusetts levied a duty on imports not subject to special schedules, equal to the colony property tax, of 1 penny in the pound, upon a valuation assessed at 20 per cent above the prime cost of the goods in the place of purchase.[206] But there were special taxes, like those on malt, sugar, and liquors, which were viewed from a different standpoint. Therefore the tariff issue became a distinct question in the colony by the middle of the seventeenth century. As early as 1655 a free-trade petition was presented to the Massachusetts assembly by the merchants of Boston.[207] Other colonies were agitating for the same policy, the New Amsterdam settlers having petitioned the States General for the repeal of duties six years previously.[208] The Massachusetts tariff, which between 1686 and 1689 applied to all of New England, was enacted periodically either together with or separate from the general tax law, and continued to affect British goods until 1719.[209] But the duties on English merchandise were merely nominal, ranging from 0.5 to 1 per cent on their prime cost. In 1719 the protests of the British Government, seconded by the governor and council, induced the assembly, after a protracted contest, to exempt from this duty "all goods imported from Great Britain."[210] The New Amsterdam duty, rising to 10 per cent on European goods, was in 1651 extended to merchandise imported from the English colonies in America.[211] The latter provision was repealed as soon as the English gained control of the province, and colonial goods were placed on the free list, in order to make New York a shipping center for the West Indian trade.[212] Until 1699 the colony continued a tax of 2 per cent on European wares, including those from the mother country.[213] That year goods imported from Great Britain were exempted.[213] But they were taxed by subsequent laws, some of which were disallowed by order of the

[204] New Netherlands, *Laws and Ordinances*, 34, 126, 348.
[205] Essex Institute, *Historical Collections*, I, 81, 82, 118, 119; American Historical Association, *Collections*, I, 272.
[206] Massachusetts, *Colonial Laws*, 70–73.
[207] Drake, *History and Antiquities of Boston*, 341.
[208] New Netherlands, *Laws and Ordinances*, 126.
[209] New Hampshire, *Provincial Laws*, 187–188. New Hampshire and Massachusetts had a tariff war in 1720–21; Massachusetts, *Acts and Resolves*, I, 31, 200, 270, 343, 432, 479, 526; II, 108.
[210] Massachusetts, *Acts and Resolves*, II, 138; Chalmers, *American Colonies*, II, 19.
[211] New Netherlands, *Laws and Ordinances*, 126.
[212] *E. g.*, New York, *Colonial Laws*, I, 171, 248.
[213] *E. g.*, New York, *Colonial Laws*, I, 248, 287, 322, 325, 419; *id.*, 403.

Crown. In 1724 an order in council forbade further duties on British goods in any of the colonies.[214] Without this prohibition tariff laws probably would have been enacted by other colonies as their dependence upon the mother country for supplies decreased. In 1716, by an act repealed two years later, South Carolina laid a duty on all imports except salt, not excepting those from Great Britain.[215] In 1711 Virginia attempted to pass a similar law, proposing at first to tax British merchandise 10 per cent and then lowering the proposed duty to 6 per cent; but the bill was defeated by Governor Spottswood.[216]

The protective influence of these laws was very slight. Not only were the rates low, seldom in any manufacturing colony exceeding 2 per cent, but, as Governor Hunter wrote to the Board of Trade, a duty of that amount "being on the prime cost, does not amount to one per cent as the goods are sold here [in the colonies]."[217] There were few specific duties except on liquors and sugar. New York imposed duties ad valorem in form, but rated on an arbitrary valuation and therefore specific in principle, upon cloths, ironware, and trinkets, shipped up the Hudson for the Indian trade, but they would have applied equally to colonial manufactures had these sought the Albany fur market by the routes then followed.[218] At a later period the duties were imposed when the goods were shipped westward from Albany.[219] So little was the protective idea in evidence in New York that a local excise was levied upon liquors distilled in the province, equal to the tariff on similar liquors imported.[219] Nevertheless, English manufacturers saw in these laws discrimination against British in favor of American manufactures and continued to protest against them even after such duties had been abolished by the British Government.[220]

But in tariff laws affecting trade among the colonies, there was distinctly an element of protection. Duties were applied to protect the farmer at the expense of the manufacturer, as well as to favor the latter; but in most cases where a manufacturing industry was affected adversely by one feature of the revenue it derived compensation from other provisions of the same act. Thus the Massachusetts brewers had to meet a heavy tax on malt from other countries or colonies, and sometimes the entire prohibition of its importation, and those in Pennsylvania were at one time compelled to pay a duty on imported hops;

[214] For resumés of New York customs legislation see O'Callaghan, *Documents Relative to the Colonial History of New York*, I, 634; III, 217, 246, 289; V, 519, 520, 581, 643, 706, 767; O'Callaghan, *Documentary History of New York*, I, 103, 104.

[215] South Carolina, *Statutes at Large* (ed. Cooper), II, 650; *cf.* also *id.*, II, 177, 200. This law discrimated in favor of colonial beer; *cf.* Chalmers, *American Colonies*, II, 86.

[216] Spottswood, Governor, *Letters*, I, 131, in Virginia Historical Society, *Publications*.

[217] Governor Hunter to the Lords of Trade, Nov. 3, 1718, in O'Callaghan, *Documents Relative to the Colonial History of New York*, V, 519, 520.

[218] New York, *Colonial Laws*, I, 170, 248.

[219] New York, *Colonial Laws*, II, 281; *id.*, 263.

[220] Chalmers, *American Colonies*, II, 118.

but beer brought into the colony was subject to relatively still heavier duties. Even before the sugar act of 1733, by which the British Government imposed—though it did not enforce—a tax upon colonial imports of sugar and molasses from the French and Spanish islands, these commodities were subject to local duties collected indirectly at the expense of the distillers, who used molasses as their raw material. But rum also was protected, and so this tax on materials hampered only their export trade. In 1718 Pennsylvania levied a duty of 4 pence a pound on imported flax, except from parts of New Jersey tributary to Philadelphia.[221] Subsequently the tax was renewed and increased, and as flax was not exported from Philadelphia, the law indicates that the Pennsylvania linen-makers were using raw materials from abroad or from the other colonies.

Specifically intercolonial duties were usually imposed either to protect manufactures or to foster direct trade, and sometimes they combined both purposes. Connecticut, New Jersey, and Maryland were destined during most of the colonial period to see their produce carried abroad, and the wares they used imported, by the merchants and ships of neighboring colonies. To gain the advantage of direct trade, Connecticut in 1717, in response to an agitation for a much higher tax, imposed a trifling duty upon goods imported from other colonies for sale. Twenty years later the same colony passed a short-lived act levying a duty of 5 per cent upon similar goods.[222] Such a law, had it been permanently enforced, would probably have increased the cost of European goods in the colony and made it easier for home manufactures to compete with them. Maryland at one time proposed to tax woodenware and fish imported from New England, but dropped the project.[223] In 1715 the colony prohibited a number of imports from Pennsylvania, including such manufactures as bread, flour, and beer.[224] About 1721 Massachusetts and New Hampshire had a tariff war, but its influence on the industries of those colonies was negligible.[225] In May 1699 New York levied a duty of 10 per cent on "all woolen manufactures made in our neighboring colonies which shall be imported into the Province and Dependency."[226] The next year the same colony, by "an act for the encouraging the brewing of beer and making of malt," in which the assembly declared that brewing and malting were "discouraged within this province by reason of the great quantities of beer and malt daily imported," levied a duty of 9 shillings a barrel on imported beer and 1 shilling a bushel on malt.[227] In 1719,

[221] Pennsylvania, *Statutes at Large*, III, 151, 239; 269; repealed, *id.*, 416.
[222] Connecticut, *Public Records*, VI, 23, Oct. 1717; VIII, 22, Oct. 1735; IX, 283, May 1747.
[223] Maryland, *Proceedings of Assembly*, 1697, 511.
[224] Maryland, *Laws* (ed. Kilty), June 3, 1715; *cf.* Chalmers, *American Colonies*, II, 160.
[225] New Hampshire, *Provincial Papers*, III, 827.
[226] New York, *Colonial Laws*, I, 404.
[227] New York, *Colonial Laws*, I, 439.

and several times thereafter, New York also laid a duty on barrels, by an act stating in its preamble that "the importation of great quantities of empty casks out of the neighboring colonies into the city of New York by experience is found to be very hurtful to the coopers inhabiting the said city, and will lay the said coopers under the necessity of deserting their habitations and employments, which will be a great discouragement to the trade and manufacture."[228] This law was complementary to the laws of Connecticut and New Jersey, taxing the exportation of cooper's stock, which had been in force about four years and may have had some influence upon trade conditions. In 1731 Rhode Island laid a duty on sugar imported from the neighboring colonies, probably for the purpose of protecting direct trade rather than refining.[229] South Carolina and Georgia taxed certain imports from the northern colonies, including provisions, brick, and lumber, all of which—except some liquors—were probably produced within their own limits.[230]

That it was the object of colonial legislators to encourage manufactures, whenever this could be done without too great a sacrifice of revenue, is indicated by the free list. In Massachusetts this always included wool and raw cotton.[231]

Colonial tonnage laws favored local ship owners and builders. Laws remitting tonnage taxes and all or part of the customs duties on wares imported in home-owned ships were general; those favoring home-built ships were less common. In 1717 South Carolina remitted duties and other dues on goods imported in any vessel owned by inhabitants of the colony, "provided such ship or vessel was built within this province."[232] One of the later New York laws, passed in 1734, exempted from tonnage taxes, in addition to coasting vessels and those owned locally or in Great Britain, all vessels, irrespective of ownership, that had been built within the colony.[233]

As soon as the States became independent, the previous restrictions on their tariff-making powers disappeared, but this did not cause an immediate revolution in their fiscal policies. The old habit of relying on direct and local taxes prevailed, even in the midst of the financial stress of the Revolution. The early import duties were merely nominal. In 1779 Virginia imposed a tax of 2.5 per cent on sales of imported merchandise, excepting salt, blankets, iron and steel, and arms and

[228] New York, *Colonial Laws*, I, 1022; II, 423, 852; III, 240. In the Act of 1734, the low cost of living in other colonies is cited as an argument in favor of protection; *id.*, II, 852.

[229] Rhode Island, *Records*, IV, 454. In 1785, Massachusetts prohibited the importation of refined sugar; Massachusetts, *Acts and Laws*, 1780–1785, Chap. XXIII, 503.

[230] South Carolina, *Statutes at Large* (ed. Cooper), III, 194; Georgia, *Acts of the General Assembly*, March 25, 1765, 10–11; *cf.* Georgia, *Colonial Records*, XVIII, 691; *Boston Newsletter*, April 25, 1765.

[231] Massachusetts, *Colonial Laws*, 70; Massachusetts, *Acts and Resolves*, I, 31; *cf.* also New Hampshire, *Acts and Laws*, 1780–1789, 398; New Hampshire, *Perpetual Laws*, 1789, 197.

[232] South Carolina, *Statutes at Large* (ed. Cooper), III, 32.

[233] New York, *Colonial Laws*, II, 843, June 22, 1734.

ammunition. In 1782, in addition to duties on liquors, sugar, and coffee, a tax of 1 per cent was levied on other goods brought into the State.[234] South Carolina, in 1783, in addition to special taxes on foreign liquors and certain tropical produce, laid a duty of 2.5 per cent on imported merchandise, but the following year it expressly exempted articles of the "growth, produce or manufacture of some of the United States," as to tax them would be "injurious to that harmony which should ever subsist between these federal States."[235] Even in the manufacturing colonies the interests of ship builders and traders were so dominant, and the working classes of the towns depended so directly upon the over-sea trade that afforded a market for the products of farmers, lumbermen, and fishing crews, that popular sentiment was averse to a high protective tariff. Nevertheless manufacturing tradesmen were numerous enough to wield influence in every policy fostering local manufactures, and their political activity seems to have been out of proportion to their number. In South Carolina the agitation against Great Britain before the Revolution, especially the opposition to importation, was led by Charleston mechanics.[236] The same class in Pennsylvania and New England was, of course, relatively much stronger. In the northern colonies, so long as political hostility to Great Britain reënforced the desire to promote home industries, protection sentiment shaped tariff legislation without entirely controlling it. Shortly before the adoption of the Constitution a definite propaganda arose in favor of domestic manufactures. This was caused by a business crisis, itself induced largely by an excessive importation of English goods after the war, and resembled similar movements in some of the colonies during the colonial period. It resulted, in 1785, in the almost simultaneous passage of protective tariff acts by Rhode Island, Massachusetts, and Pennsylvania, followed later by New Hampshire, New York, and some of the other colonies. Not only were the duties imposed by these laws much higher than in the colonial acts, but their range and variation indicated an attempt to adjust them to the supposed needs of existing industries. Specific duties on general manufactures for the first time figured prominently in American tariff schedules. The first of these laws went into effect in Rhode Island, July 10, 1785, its title stating the object to be "for encouraging the manufactory" of certain articles within the State.[237] In addition to the earlier revenue tariff of 2.5 per cent, it levied specific duties on axes and agricultural implements, fine shoes, hats, vehicles, and a few other manufactures; and new ad valorem duties ranging from 10 to 25 per cent on tools, soap, and

[234] Virginia, *Statutes at Large*, x, 169–170; xi, 122.
[235] South Carolina, *Statutes at Large* (ed. Cooper), iv, 578, 581, 647.
[236] McCrady, *History of South Carolina under the Royal Government*, 645–646.
[237] Rhode Island, *Records*, x, 115.

candles, paper, tinware, leather manufactures, apparel, and a number of minor articles. The Massachusetts act, which went into effect August 1 of the same year, was designed not only "to encourage agriculture, the improvement of raw materials and manufactures," but also "to discourage luxury and extravagance of every kind."[238] Duties were both specific and ad valorem, on different articles, and included about the same range of manufactures as in Rhode Island. The Pennsylvania law, passed the following September, contained a preamble which was an exposition of protective doctrine:

"Whereas divers beneficial arts and manufactures have gradually been introduced into Pennsylvania, and the same have at length risen to a very considerable extent and perfection, inasmuch that during the late war between the United States of America and Great Britain, when the importation of European goods was much interrupted, and often very difficult and uncertain, the artisans and mechanics of this state were able to supply in the hour of need not only large quantities of weapons and other implements, but also ammunition and clothing, without which the war could not have been carried on, whereby their oppressed country was greatly assisted and relieved; and whereas, although fabrics and manufactures of Europe and other foreign parts imported into this country in times of peace, may be afforded at cheaper rates than they can be made here, yet good policy and a regard for the well-being of divers needful and industrious citizens, who are employed in the making of like goods in this state, demand of us that moderate duties be laid on certain fabrics and manufactures imported, which do most interfere with, and which (if no relief be given) will undermine and destroy the useful manufactures of the like kind in this country."[239]

This act contained a schedule of specific and ad valorem duties on different articles, much more elaborate than in any previous American law, and afforded more protection than the New England enactments just described. With its several amendments it continued the best example of protective legislation in America at the time the Constitution was adopted. But it was a result rather than a cause of the relatively high industrial development of that State. Most of these laws admitted without duty goods produced in neighboring States, though there were occasional exceptions. Raw materials used in manufactures also were on the free list. Tariff laws, being primarily revenue acts, were subject to frequent revision, and their features a matter of public discussion. In 1788 the "Tradesmen and Manufacturers of Boston" published an appeal to their brethren in the several seaports of the Union, to the effect that excessive imports of foreign goods should be discouraged and home manufactures fostered by laws and associations. They reported that they had recently secured a law in Massachusetts levying duties on several articles named in their petition,

[238] Massachusetts, *Acts and Laws*, 1784–1785, Chap. 17, 453–455, 733; *cf.* however, *id.*, 1782–1783, Chap. 12, 507–513.

[239] Pennsylvania, *Statutes at Large*, XII, 99–104.

"for the encouragement of industry and for the promoting their own manufactures."[240] Thus the colonial period closes with the rising importance of a new fiscal policy as the most important feature of legislation affecting industry.

REGULATION OF MILLS AND OTHER INDUSTRIAL ESTABLISHMENTS

In early days mills were considered as affected with a public interest, milling rights sometimes had the force and limitations of public franchises, and the regulation of these and other industrial establishments extended to fixing rates for their services and governing in detail the manner in which the latter were rendered. The right of government intervention was based partly upon the fact that mills used water-powers, which were not regarded as unconditionally private property. Most of the colonies passed general acts to regulate the construction of mill dams, to determine the process of condemning land for mill improvements, and to provide for the preservation of fishways and navigation.[241] Sometimes the public had to step in to adjust the respective rights of different mill-owners on the same stream.[242] In New England the erection of a mill usually required the consent of the town authorities, and in Delaware and the colonies further south of the provincial legislature.

Gristmills, unless exempted by special agreement, were subject to toll laws establishing the charge for grinding.[243] Throughout New England this was usually one-sixteenth the wheat and one-twelfth the Indian corn ground, though the rates were not everywhere and at all times uniform. One early New Amsterdam ordinance varied from the usual practice by establishing a cash toll.[244] The New Jersey law suggests the importance of merchant milling in that province, by establishing a single toll for both grinding and bolting. This was one-tenth during most of the colonial period.[245] In New England bolting was usually done at home, and as the custom mills did not manufacture largely for export they often had no facilities for performing this service. The greater scarcity of mills in the southern colonies is indicated by the higher tolls they were permitted to charge. In Maryland these were in early times one-sixth, instead of one-sixteenth as in New England. The law stated that if it were made smaller little wheat would be

[240] *American Magazine*, IV, 347, Aug. 20, 1788.

[241] *E. g.*, New Hampshire, *Acts and Laws* (Boston, 1726), 72; *id.* (Portsmouth, 1761), 181; Massachusetts, *Acts and Resolves*, III, 267; *Laws of Newcastle, Kent, and Sussex* (ed. Franklin), 43; North Carolina, *Acts of Assembly* (ed. Davis), 219; Maryland, *Archives, Proceedings of Assembly*, II, 211.

[242] *E. g.*, Virginia, *Statutes at Large*, III, 401; Rhode Island, *Acts and Laws*, 1745, 210; *ibid.*, 1767, 190.

[243] *E. g.*, exemption, Rhode Island, *Acts and Laws* (Newport, 1767), 192.

[244] New Netherlands, *Laws and Ordinances*, 123.

[245] New Jersey, *Grants, Concessions and Acts*, 547; New Jersey, *Laws of the State* (ed. Patterson), 381.

ground.[246] As late as 1759 the Maryland toll still stood at one-sixth for corn, though it had been reduced to one-eighth for wheat. The same rates prevailed in Virginia.

Massachusetts required that mill-stones, screens, and fans should be publicly inspected, and in the middle colonies, where flour was manufactured for export, similar regulations were enforced.[247] Plymouth Colony fined millers for poor grinding.[248] A similar law in Virginia contains a provision that where a mill was operated by a slave or servant thirty lashes should be substituted for the fine. The laws also provided that millers should grind for their customers in regular turn.[249] In 1785 an act was passed in Delaware that shows the greater profit of merchant as compared with custom milling at the tolls charged in that State. After declaring that millers were refusing to grind custom flour, the law directed that all mills on Christiana Creek and the lower Brandywine should grind for customers certain days of the week. It was found necessary later to increase the penalties for violating this act.[250] Sawmills and other manufacturing establishments were less frequently subject to this kind of regulation, and the laws regarding them illustrate no new principles.

REGULATION TO ASSURE THE QUALITY OF MANUFACTURED COMMODITIES

Colonial laws to maintain the quality of manufactured articles survive in our modern system of food inspection and form the basis of our trade-mark legislation. They were derived from two sources—the early British market laws, applying principally to provisions, under the administration of town or market inspectors; and laws guarding the standard of staple manufactures, enforced either by guilds or companies, or lately by government officials. Of laws of the former class the most common in the colonies was the assize of bread, which was almost universal in the northern and middle provinces, by which the weight, quality, and price of a loaf of bread were adjusted by a sliding scale to the current price of wheat. There was a somewhat similar assize of beer. Regulations governing manufactures in a narrower sense were intended to prevent adulteration and short measure, and applied chiefly to articles exported, such as lumber, flour, and packed meats. The first object of such laws was to promote the production of the commodities in question by increasing their sale in foreign countries.

Thus flour was inspected in the middle colonies. In Pennsylvania laws for this object were recommended repeatedly in the governor's

[246] Maryland, *Archives, Proceedings of Assembly*, XIX, 68.
[247] Massachusetts, *Acts and Resolves*, IV, 607.
[248] New Plymouth, *Compact, Charter and Laws*, 61.
[249] Virginia, *Statutes at Large*, III, 401.
[250] Delaware, *Session Laws*, 1785, 23; *id.*, 1790, Jan. sess. 10.

messages to the assembly[251] and several such statutes were enacted. Both New York and Pennsylvania introduced a standard system of grading, using the official term "superfine" for flour of the highest quality; each barrel was tested by boring. A curious provision of the New York law of 1769 is that flour should not be ground so fine as not to rise.[252] The size of barrels was likewise prescribed. Packages must bear both the colonial inspector's brand and the name of the maker.[252] Ship's bread, which also was an article much exported from the colonies, was subject to similar regulations. As early as 1678 New York, in providing for standard packages for this product, passed an act stating that, "the selling of white bread, commonly called water bread, milk bread, and butter bread," had declined in the West Indies on account of fraudulent packing.[252] The Carolinas were less concerned in flour exports than the colonies north of them; but they shipped abroad large quantities of salted meat. Therefore the legislature of North Carolina provided in 1770 that meat packed for export should be shipped only in white oak casks, with a half bushel of salt to each barrel, and that no cask should contain more than two pork heads or two shanks of beef.[253] Massachusetts was obliged to legislate against the use of large and lengthy bungs in tar and turpentine barrels, which were employed to lessen their more valuable contents.[254] Laws against adulteration were directed against mixing lime and sea salt with potash,[255] water and chips with tar, and against brewing beer with "extract of sugar, honey, foreign grains or Guinea pepper."[256] In Pennsylvania—but this was to increase the farmer's market for grain—brewers were required to state under oath, when procuring a license, that they did not employ molasses in making beer.[257] The laws relating to lumber provided for scaling and for discarding imperfect pieces. Bricks were required to be of standard size, made of clay dug at the right season; and in order to insure regularity of form, they must be made with iron-shod molds.

In case of goods in barrels and other containers, the inspector—or sealer as he was sometimes called—after testing the contents, branded the package with a government mark. Flour, tar, and potash, tobacco barrels, and several other commodities or articles were required to bear the name, initials, or other designation of the manufacturer. The latter was thus protected by law in the use of this mark, which became both a guarantee of quality and an incentive to maintain standards. Out of this requirement, which itself probably developed from an earlier custom, grew our trade-mark legislation.

[251] *E. g.*, Pennsylvania, *Archives*, Ser. IV, vol. I, 475, 674.
[252] New York, *Colonial Laws*, IV, 1096; *id.*, V, 833; *id.*, IV, 1021.
[253] North Carolina, *Acts of Assembly* (ed. Davis), 457.
[254] Massachusetts, *Acts and Resolves*, I, 574.
[255] New York, *Colonial Laws*, IV, 926.
[256] Pennsylvania, *Statutes at Large*, III, 291.
[257] Pennsylvania, *Statutes at Large*, III, 382; *cf.* also Massachusetts, *Acts and Resolves*, I, 724.

Some commodities were inspected primarily to protect home consumers, and only incidentally to encourage exportation. Laws applying to the manufacture of leather, and to some extent those regulating ship-building, had this as their principal object. Leather inspection laws existed in nearly all the colonies and were among the earliest acts passed by colonial assemblies. In default of a standard of quality capable of legal description, these laws prescribed the processes to be used by manufacturers. Among other features of this legislation was the attempt to maintain tanning, currying, and shoemaking as separate trades.[258] There was good English precedent for this policy, but it could not be enforced in the colonies on account of the limited market accessible to each manufacturer and the scarcity of skilled labor. The former condition made it impossible for a number of separate artisans performing different processes to support themselves by their trade in one locality, and the second made it necessary for the community to avail itself of the skill of every mechanic, even in a trade to which he had not been primarily trained. In 1644 Connecticut, and in 1660 Massachusetts, passed laws to regulate the quality of woolen cloth;[259] and at a later date the town of Londonderry tried similarly, by official inspection and by the use of a special brand, to insure the quality of linen manufactured in the vicinity.[260]

Ship-building was made subject to inspection in Massachusetts and Connecticut, special surveyors being appointed to see that each vessel of larger size was well made of sound timber.[261] Massachusetts tried, in 1644, to place this industry under the supervision of a chartered company. The colonists were still Englishmen and naturally adopted an institution familiar in the country where they were born.[262] In 1648 the colony organized at least two of its journeymen industries, coopering and shoemaking, into craft societies.[263] These societies were delegated authority to regulate their respective trades. Nearly half a century later the Massachusetts hatters petitioned for similar privileges, but were refused until they could make hats as good and cheap as those imported.[264]

[258] *E. g.*, Massachusetts, *Laws and Liberties* (Cambridge, 1672), 88–90; Massachusetts, *Acts and Resolves*, I, 312–314; Connecticut, *Public Records*, IV, 74, 83, May 1692.

[259] Connecticut, *Public Records*, I, 104, June 1644; Massachusetts Bay, *Records*, IV, 380.

[260] Bagnall, *Textile Industries*, 17.

[261] Massachusetts, *Colonial Laws*, 138–139, Massachusetts, *Acts and Resolves*, I, 114; Connecticut, *Acts and Laws* (1769), 224.

[262] Massachusetts, *Colonial Laws*, Introduction, 72.

[263] Shoemaker's charter printed in *Documentary History of American Industrial Society*, II, 21. The petitions, counter-petitions and charter are in Massachusetts, *Archives*, LIX, 1647; Cooper's petitions and charter, *ibid.*, 1648, 1667, 1668; *cf.* also petitions of the coopers of South and East Hampton, Long Island, Oct. 13, 1675, in O'Callaghan's *Documents Relative to the Colonial History of New York*, XIV, 701, 702.

[264] Felt, *Annals of Salem*, II, 170; *cf.* Weeden, *Economic and Social History of New England*, I ,274.

MISCELLANEOUS LAWS AFFECTING MANUFACTURES

Besides laws directly relating to manufactures, or those that in their later development incidentally have influenced industries, were acts of minor or less immediate importance, to which a brief reference will be sufficient. At a time when the manufacturing operative was still an artisan, possessing the acquired skill and sometimes the secrets of an industrial art, his knowledge and training were primary requisites in introducing a new manufacture or maintaining an old one. Therefore industrial education, in an older and somewhat different sense from that in which the word is now used, was a subject of acknowledged public concern. The Massachusetts law of 1640 directed the town authorities to consider "what course may be taken for teaching the boys and girls in all towns the spinning of yarn."[265] Six years later Virginia, "for the better educating of youth in profitable trades and manufactures," ordered the erection of two public flax houses in Jamestown, where two children from each county were to be taught, under an appointed master and mistress, carding, knitting, and spinning.[266] In 1663 the same colony directed each county to provide a house "for the educating and instructing poor children in the knowledge of spinning, weaving, and other useful occupations."[266] Maryland had similar county industrial schools.[267] At least twice in the eighteenth century Massachusetts opened spinning schools at Boston.[268] The "Frame of Government" of Pennsylvania provided that all children twelve years old should be taught "some useful trade or skill, to the end that none may be idle, but the poor may work to live, and the rich, if they become poor, may not want."[269] A still more general provision for the industrial training of youth was the institution of apprenticeship, which existed in the colonies by both common law and statute. Though these laws were not used to protect trade monopolies, as in Great Britain, and we are given to understand by British protests that they were laxly enforced in some trades, records show that they were no empty formality. In Massachusetts it seems to have required a special act to free an apprentice from his obligations, even after his master had absconded and deserted him.[270] In a typical instance, in the seventeenth century, a Salem goldsmith indentured an apprentice for twelve years, the boy to receive his board, clothing, and £3 at the end of his term of service.[271] Similar indentures were common in Vir-

[265] Massachusetts, *Records of the Governor and Company*, I, 294.
[266] Virginia, *Statutes at Large*, I, 336, 337; *id.*, II, 266, 267.
[267] Douglass, *British Settlements in North America*, II, 375.
[268] Bagnall, *Textile Industries*, 18–19, 29–37. Such schools were common in England; Cunningham, *Growth of English Industry, Modern Times*, I, 46, Note 3; 52, Note 3.
[269] Pennsylvania, *Archives*, 4th series I, 42.
[270] Massachusetts, *Records of the Governor and Company*, IV, Part 1, 150.
[271] Felt, *Annals of Salem*, II, 396.

ginia and often were used by magistrates to provide for poor children and orphans.[272] A French writer shortly before the Revolution noted that all American mechanics served a regular apprenticeship, though there were no companies or guilds.[273] The institution was maintained in the colonies more by the desire of masters to secure regular labor than by a wish either to protect craft standards or to restrict competition. Franklin, speaking of Pennsylvania, wrote:

> "The desire among the masters to have more hands employed in working for them, induces them to pay the passage of young persons, of both sexes, who, upon their arrival, agree to serve them one, two, three, or four years; those who have already learned a trade agreeing for a shorter time, in proportion to their skill, and the consequent immediate value of their services; and those who have none agreeing for a longer term, in consideration of being taught an art their poverty would not permit them to acquire in their own country."[274]

Among other acts, one purpose of which was to encourage manufactures, were the laws passed at various times in Maryland, Virginia, and South Carolina for the settlement of towns. These laws offered special inducements to artisan settlers who plied their trades; but had little influence in overcoming the centrifugal economic forces that in the planting colonies dispersed population and prevented centralized industries.[275] Laws establishing semi-annual fairs and weekly markets, passed in both the northern and the southern colonies, belong to a history of trade rather than of manufactures; but by affording an opportunity to exchange the fireside manufactures of farm and village households for wares of similar origin from other makers or localities, these assemblies created, in a limited sphere, a new motive for industry.[276]

Few laws restricting manufactures are recorded in colonial annals. As a measure of fire protection Massachusetts required a permit from the local authorities for the erection, in seaport and market towns, of potters' kilns, bakeries, or chocolate mills.[277] At Philadelphia similar regulations were enforced in case of bakeries and coopers' shops.[278] New York, early in the eighteenth century, prohibited the burning of oyster-shells into lime and the distilling of rum within the city, the

[272] Bruce, *Economic History of Virginia in the 17th Century*, I, 593.
[273] Crèvecœur, *Lettres d'un Cultivateur Américan*, III, 487, 488.
[274] Franklin, *Works*, VIII, 612.
[275] Maryland, *Archives, Proceedings of Assembly*, VII, 609; XIII, 218; Maryland, *Laws of the Province* (ed. Bradford), 15; Virginia, *Statutes at Large*, II, 476–477 (following precedent of English city charters).
[276] Massachusetts, *Laws and Liberties* (Cambridge, 1672), 49, reprinted in Massachusetts, *Colonial Laws*, 150; Massachusetts, *Acts and Resolves*, 1693, Chap. 4; *id.*, 1696, Chap. 2; New Plymouth, *Compact, Charter and Laws*, 298; Connecticut, *Public Records*, 1645, I, 125, New Jersey, *Archives*, XXIV, 439; Johnston, *History of Cecil County, Maryland*, 268, 269; Virginia, *Statutes at Large*, III, 408; VIII, 255; South Carolina, *Statutes at Large* (ed. Cooper), III, 204.
[277] Massachusetts, *Acts and Resolves*, II, 1054; Massachusetts, *Special Laws*, I, 105.
[278] Pennsylvania, *Statutes at Large*, IV, 215.

people having the idea that ill smells arising from these establishments had caused an epidemic.[279] On one or two occasions distilling was prohibited, not for moral reasons, but because it made molasses scarce or lessened the supply of grain.[280] The business most burdened with restrictive legislation was printing. In 1671 Berkeley discouraged the introduction of that art in Virginia, and Governor Dongan was instructed to allow no press to be set up in New York. In 1683 Berkeley's successor was ordered to prohibit the erection of a press in Virginia, and three years later Andros arrived in New England with authority to stop printing in Massachusetts, though he seems not to have availed himself fully of this power. Even the colonial authorities sometimes licensed publications, and Massachusetts at one time established a censorship and limited printing to a Cambridge press.[281]

Among miscellaneous laws of passing interest, though of little importance in the history of industry, were the regulations to limit or prohibit the sale of liquor in the vicinity of iron works. The title of these laws indicates that they were regarded as encouraging the manufacture of iron. By a Pennsylvania act of 1726, no public house was to be licensed within 2 miles of a furnace, and ten years later this limit was extended to 3 miles.[282] Maryland forbade tavern-keepers to harbor or give liquor to employees of iron works.[283] In Connecticut, on the other hand, liquor for the New Haven furnace hands was at one time imported duty free.[284]

Sometimes the colonies indirectly favored the sale of their own manufactures or produce by tax and license laws. Connecticut, in levying a tax on merchants' sales, excluded from the assessment articles of local growth or manufacture.[285] Pennsylvania, like some of her sister colonies, licensed peddlers, but exempted from this provision and the accompanying fees those selling only manufactures of the province.[286] Among laws even more remotely influencing manufactures was the inheritance act of Massachusetts, dividing real and personal property equally among the heirs. We are informed that the people were "bigoted" to this law, and chose to die intestate. The result was a minute subdivision of farms in eastern Massachusetts, somewhat like that in France under the laws of Napoleon, which in the days of handicraft industries often made the farmer turn manufacturer in order to eke out the scanty income from his diminished hold-

[279] Lord Cornbury to the Lords of Trade, July 12, 1703, in O'Callaghan, *Documents Relative to the Colonial History of New York*, IV, 1064; New York, *Colonial Laws*, I, 538.

[280] *E. g.*, Connecticut, *Acts and Laws*, 1715, Suppl. 341; *id.*, 348; Massachusetts, *Acts and Resolves*, V, 731; New York, *Laws of the State*, I, 112.

[281] Bishop, *History of American Manufactures*, I, 161, 162, 163.

[282] Pennsylvania, *Statutes at Large*, IV, 65, 301.

[283] Maryland, *Acts of Assembly*, 23–24, July 1732.

[284] New Haven, *Colonial Records*, II, 454.

[285] Connecticut, *Public Records*, XIII, 513, Oct. 1771.

[286] Pennsylvania, *Statutes at Large*, IV, 143; *cf.* Lieutenant-Governor Clarke to Lords of Trade, June 13, 1740, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VI, 161.

ing.[287] Emigration and the sea always drew off a portion of the surplus population, but accounts of conditions about the time of the Revolution show that in townships around Boston lands already were held in farms so small that side industries were necessary.

INFERENCES AND CONCLUSION

No accurate record exists from which we can infer, even in the most general way, the influence of separate acts or groups of acts upon the development of colonial manufactures. Even taking this body of legislation as a whole, its interest for industrial history rests in the illustration it affords of motives and ambitions, and of the popular attitude towards manufactures, rather than in positive results. No original principles characterized the enactments of colonial lawmakers, yet their work was not copied servilely from that of the mother country or solely with a motive of imitating her laws. Although their wants were primitive according to the standard of the present time, the English settlers in America were less self-dependent in proportion to their total consumption than the people of to-day. The economic motive of this legislation was to establish such an independence in regard to essential manufactures as would prevent hardship were the colonies deprived of foreign supplies, and at the same time to render those foreign supplies more copious by stimulating exchange with the mother country and Europe.

In a sense these two objects were mutually antagonistic. If the regulative acts intended to raise the quality of lumber, provisions, and similar commodities shipped abroad succeeded in securing for them command of foreign markets, the returns of this trade were sure to depress manufactures of woolen and flax and other domestic industries which were fostered by bounties, premiums, and similar public support. On the other hand, in so far as these bounties and premiums did direct the attention of the people to homespun industries, in a country where the entire supply of labor was absorbed in production, the manufacture of cruder commodities for exchange was proportionately lessened. These statutes were more numerous and detailed in New England than elsewhere, corresponding with the more minute supervision of the Puritan governments over the activities of their people. The laws in Pennsylvania, which became ultimately the leading manufacturing colony, responded more closely than elsewhere to the practical demands of growing industries. In the South such enactments were public expressions of the discomfort of a one-sided economic life rather than measures adapted to practical exigencies.

In all the colonies the effect of this legislation was lessened by the

[287] Douglass, *British Settlements in North America*, I, 515.

temporary character of the acts, which were passed for periods varying from two to seven years and not infrequently repealed before their natural term, and by their uneven administration, not only in different places, but even in the same place under different officers. The inspection laws appear to have fallen into abeyance or to have been evaded whenever their promoters neglected to give them constant and vigilant support.

Yet that many of these laws had some positive influence in promoting manufactures is indicated by their very repetition. The colonists were too practical to continue granting bounties when they produced no result. Now and then an act was repealed because it was found without the desired effect, as in case of a South Carolina law promoting ship-building; at other times it was repealed because no longer necessary, the end for which it was enacted having been attained. Thus Pennsylvania, either on account of the law or as a result of natural development not affected by legislation, found it possible to repeal its hemp bounties. Appropriations for the payment of bounties in different colonies indicate that the industries they covered were established. Massachusetts repealed its first bounty act because it found the law imposed too great a burden on tax-payers. In repealing the earlier Virginia laws, the assembly stated that by them divers persons had been induced to engage in the pursuits they fostered.

Grants of loans and subsidies were indispensable to establish any considerable enterprise, at a period when capital was so scanty as in the colonies and distributed among a large number of small holders, who did not intrust their savings freely to collective or speculative enterprises; but we have no record of establishments except iron works permanently established through this form of assistance. Neither were monopolies and patents an appreciable influence in promoting new industries or maintaining old ones. The only colonial tariffs protective in character were those imposed on the products of other colonies, and while they may have slightly influenced the distribution of colonial manufactures, they did not affect those manufactures as a whole. Nor did any of these laws afford a real precedent for the legislation by which the early Republic attempted to stimulate manufactures. The policy they represented was so generally accepted that no abrupt break occurred in this legislation, except the tariff acts, when the Constitution was adopted. The States continued their inspection laws and in some cases their bounties and other public favors to manufacturers. But colonial experience afforded no example of either success or failure conspicuous enough to commend any element of its legislation particularly to the Federal Government or to State lawmakers of a later period.

This generally negative result—though there were local and temporary exceptions—was due to the relative unimportance of artificial

influences as compared with the immensely preponderating natural forces dominating the early growth of industry. Government as a whole was less important in the colonies than it is to-day, and it was less efficient, especially in controlling economic conditions. At the same time nature herself, still untamed, determined even more than at present the direction taken by human effort. Therefore, the legislation both of the colonies and of the mother country may be left, as an essential but a relatively subordinate part of the record of our manufacturing history, while we proceed to a consideration of those more important influences of resources and position that mainly shaped the early economic life of America.

CHAPTER IV

INFLUENCE OF NATURAL RESOURCES UPON COLONIAL MANUFACTURES

Forest resources, 73. Minerals, 75. Relation of agriculture to manufactures, 76. Fur and wool, 77. Flax and hemp, 82. Cotton, 83. Fisheries, 85.

Some raw materials, as previously noted, were so abundant in America as to encourage from the earliest settlement manufactures of the cruder sort. Pine forests, supplying ship timber, pitch, tar, and turpentine, were the first forms of natural wealth to attract the attention of English explorers. American white oak was easily riven into staves for sugar shippers in the West Indies and wine merchants in the Portuguese and Spanish Islands. This timber also furnished containers for fish, salt meats, flour, and biscuit, and for the rum and molasses, the pitch, tar, and turpentine, and the whale oil, which constituted important items of colonial trade. As coal was not yet employed in industry, the abundance of wood fuel gave America facilities for making iron, glass, brick, and pottery. Bark was plentifully at hand for tanners, and the herds of cattle that multiplied throughout the half-tilled country supplied hides for leather and provisions for export. Surplus grain found a market in the form of flour and ship's bread. The supply of fur was large enough to give colonial hatters a decided advantage over those of Great Britain. On the other hand, the textile fibers (wool, flax, hemp, silk, and cotton) never were abundant enough to constitute a motive for manufacturing. Rather, their scarcity constantly checked the rise of industries that with a more liberal supply of raw materials might have become important.

FOREST RESOURCES

In some districts lumbering preceded even agriculture. Among the initial exports of Virginia and Plymouth was riven timber. The earliest New Hampshire and Maine settlements were logging communities. Sawmills were among the first enterprises established in Georgia. Based directly upon the forest rose four industries—lumbering, shipbuilding, the manufacture of pitch, tar, rosin, and turpentine, and the making of potash. The most valuable timber in America, especially to the British authorities, was the white pine of New England, accessible on account of its proximity to the northern coast and to the Connecticut River. This timber supplied masts and spars for the royal navy;

but it was sought also by mill men for lumber, and where power and transportation were not at hand furnished tar and turpentine. Cedar and spruce were likewise among the New England soft woods used for lumber. In the eighteenth century the fir forests around Albany supplied boards and ships for both colonial and foreign markets. Until shortly before the Revolution the yellow pine of the South was employed mainly for making pitch, tar, and turpentine.

Among the hardwoods, red and white oak were of chief industrial importance, especially in the manufacture of cooperage stock. Several colonies required by law that tight casks, used to ship provisions, should be of the latter timber.[1] Oak planks were exported in some quantities. Douglass speaks of the oak of Connecticut and Maryland as easily riven into staves, but as too soft and spongy to make durable ships.[2] An early writer described the Pennsylvania oaks as yielding logs between 50 and 60 feet long, clear of knots, and straight-grained, which made them easily available for ship timber.[3] About the middle of the eighteenth century the live oak was found to supply a timber for ships excelling in durability the English oak as much as the latter excelled the lighter American hardwoods previously used. This discovery caused ship-building in the colonies to shift southward.[4]

In Louisiana cypress was employed for house frames and shingles, much as cedar was used in the North, and the abundance of this timber caused some to be manufactured for export.[5] Among cabinet woods, wild cherry and walnut were used for furniture and gun stocks. In the central colonies the red maple was made into spinning-wheels, plates, bowls, and furniture. Sweet gum, fir, and white cedar also were used by joiners, especially for furniture of the cheaper sort. The New Jersey Swedes turned trenchers and bowls from the knobs of the native ash. Laurel was used for pulley axes and weavers' shuttles.[6] Native barks and woods were employed for dyeing. The abundance of oak and hemlock bark was a real incentive to tanning and made the colonists at an early date in great measure independent of foreign supplies of leather.

However, the presence of forests had little influence on general manufactures unless attended by two other advantages, water-power and water transportation. Small sawmills, to supply neighborhood demands, were built at remote interior points; but the commercial manufacture of lumber was long confined to the fall line in New England and the central colonies, and was most active where this line approaches

[1] *E. g.*, Pennsylvania, *Statutes at Large*, IV, 73; North Carolina, *Acts of the Assembly* (ed. Davis), 457.

[2] Douglass, *British Settlements in North America*, II, 276.

[3] Thomas, *History of Pennsylvania*, 40.

[4] Bishop, *History of American Manufactures*, I, 85; Crèvecœur, *Lettres d'un Cultivateur Américain*, III, 543.

[5] *History of the British Dominions in North America*, Bk. VIII, 191.

[6] Kalm, *Travels into North America*, I, 131, 265, 327, 329; II, 95.

the coast, as in New Hampshire and Maine. The coastal districts of Massachusetts were so early denuded of merchantable timber that measures were taken for its protection within fifty years of settlement. A Plymouth law of 1670 mentions that several towns "are already much straightened for building timber."[7] Boston early received its firewood from Maine.[8] By 1750 similar conditions prevailed around Philadelphia, partly because fuel-using industries, especially brick kilns and iron furnaces, were exhausting the local forests.[9] By the time of the Revolution, or soon afterwards, a local scarcity of timber prevailed even at some interior points, such as Winchester, in the Valley of Virginia;[10] but except in one or two of the older colonies this condition did not affect manufactures. Meanwhile, in regions remote from the sea and in the planting colonies, timber was usually destroyed to clear the land for agriculture. Such use as was made of it, after supplying house and fuel for the planter, was to leach the ashes for potash or to boil out the tar it contained in rudely constructed kilns. These economies were a utilization of waste products, and seldom developed into well-regulated industries solely because raw materials were present. Resinous woods were not used for making potash, and of course hardwoods did not supply tar. Therefore these two manufactures, as accompanying land clearing, were respectively more important in the northern and in the southern colonies. But they required public encouragement, from both the colonies and the mother country, to become well established. For them the timber resources of America afforded an opportunity rather than a dominant motive. Even ship-building flourished only when fostered by several coöperating influences, of which the presence of raw materials was not decisive. Abundant timber alone did not domicile the industry in the southern colonies; but where power and transportation were at hand, lumbering, without bounties or other aid, attained importance, and throve in spite of legislative restrictions.

MINERALS

The occurrence of iron ore in America was observed before actual settlement. In conjunction with abundant fuel it made conditions favorable for smelting, but was not decisive in establishing this industry. The manufacture did not supply the local market until it received direct encouragement from England. Iron ore was a resource, like brick and potters' clay and glass sands, that supplied a need when that arose, but did not furnish sufficient incentive to direct capital and labor into new channels.

[7] New Plymouth, *Compact Charter and Laws*, 164, 165.
[8] Douglass, *British Settlements in North America*, II, 69.
[9] Kalm, *Travels into North America*, I, 73.
[10] Weld, *Travels through North America*, 169.

Without attempting a geological classification of the ores then known, roughly speaking, and in language that would have been familiar to the colonists themselves, the mineral existed in two forms: bog ores found in eastern Massachusetts and at a few places along the New Jersey coast, and rock ores which supplied the furnaces and forges of the uplands from the Connecticut River, in a circle north of New York City, through northern New Jersey and eastern Pennsylvania southward. The former were worked first in New England, and were well adapted to supply castings and hollow ware, which were among the first necessities of the colonists and which, when imported, were most heavily charged with freight and breakage. In 1653 both bog and rock ore were used at Lynn.[11] Better iron was made a century later, when the upland ores began to be worked extensively.[12] But the prominence of Pennsylvania in this industry is ascribed rather to the patience and perseverance of the German iron-masters than to exceptional natural advantages in that province and its immediate neighbors. Though mines of lead and copper were discovered, and some of the latter were worked, neither gave rise to industries during this period. At the time of the Revolution the great wealth of industrial metals in America, that has added to the later prominence of the United States as a manufacturing nation, was virtually unexploited. Hardly a single colonial mine is now in operation, and the industries founded on the mines of that period have disappeared or changed locality.

RELATION OF AGRICULTURE TO MANUFACTURES

As supplying raw materials, agriculture influenced manufactures chiefly in the central colonies. While subsistence farming was characteristic of New England, and commercial agriculture of the colonies south of Maryland, from New York to Delaware there was a balance between these two. Even New England had some commercial farming to supply the fishing and trading fleet, and Connecticut and Rhode Island exported provisions of their own production; while on the other hand, in Virginia and Maryland the small farmers and many of the planters raised their own provisions. But in the provinces tributary to New York and Philadelphia agriculture supplied staple manufacture for export. Flour, bread, and beer were among the most important items of their trade, and merchant milling was the principal industry.

Not so strongly attracted to the sea as their northern neighbors, nor to the land as those to the southward, the people of these colonies also developed varied industries, in sympathy with, and subordinate to diversified agriculture. As forests were the efficient cause of colonial lumbering, and a contributing cause to ship-building and the produc-

[11] Massachusetts, *Archives*, LIX, 47; Corning, *The First Iron Works in America*, 7.
[12] *Cf.* Massachusetts Historical Society, *Collections*, Ser. VI, vol. VII, 149.

tion of naval stores, so we may say that in the central provinces grain farming was the efficient cause of milling and contributed directly to many other manufactures arising in the midst of a thriving farming population only partly supported by a commercial crop. Before the Revolution flour milling became important also in Virginia and Maryland, and even began in the Carolinas. Herds of cattle and droves of swine throve in a semi-wild condition in the mild climate of the South and transported themselves to market. In the central and northern colonies they were a necessary incident of small farming. As the supply exceeded the domestic demand, they were exported in the form of salt meat, and their abundance created what already was termed "the manufacture of provisions," an industry destined to become, in value of product, the greatest in America.

FUR AND WOOL

The abundance of furs in America probably suggested and certainly supported the manufacture of hats. When receding frontiers and consequently scarcer materials, together with hostile legislation, caused this business to decline somewhat relatively to other industries, it was revived by the substitution of wool for fur in hats of the cheaper sort used by the colonists. Yet wool itself was not produced in sufficient quantities for home demands. In case of all textile fibers the relation of colonial manufactures to other raw materials was reversed, and instead of being promoted by their abundance they were restricted by their scarcity. No new fibers were discovered in America, and at first conditions were not favorable for producing those introduced from older countries. Before 1645 New England was importing wool from Spain.[13] About the same time, as we have seen, Connecticut gave public encouragement to the importation of cotton from the West Indies. The cultivation of flax and hemp was repeatedly enjoined upon early settlers in order to provide materials for spinners.

Wool was in the eyes of the colonists the most important raw material for clothing, and relatively to cotton was more used than at present. Climate made it the staple material for heavy clothing in the North, and even in the South its use was continued by customs inherited from wool-growing England. Wool also entered into the manufacture of lighter fabrics, where it now has been supplanted entirely by cotton. The difficulty of raising sheep in the infant settlements was very great. English breeds were not improved, but rather deteriorated by their transfer to frontier conditions in America.[14] Wolves and other beasts of prey ravaged the flocks, and for this reason the wool-growing centers of the colonies were mostly upon such coastal

[13] Winthrop, *History of New England*, II, 186, *cf. id.*, II, 94, 144.
[14] Compare, however, Byrd, *Dividing Line*, 38; Thomas, *History of Pennsylvania*, 22–23.

islands as Nantucket and Martha's Vineyard and on easily protected peninsulas like Nahant, which were devoted largely to sheep-raising.[15] Hempstead Heath, on Long Island, was for similar reasons known as a place "for the maintaining the pasturing" of sheep.[16] In 1678, out of 63 families paying taxes in Easthampton, Long Island, 50 were sheep-owners.[17] Newbury, on the Massachusetts coast, enjoyed similar facilities for grazing, and about 1685 was supposed to own between 5,000 and 6,000 sheep.[18] But of the colonies, Rhode Island paid most attention to this industry.[19] In 1648 John Winthrop imported sheep from that district, and until after the Revolution Connecticut Valley settlers seem regularly to have bought wool from Newport.[20] In 1726 a Boston merchant sent 60 ewe-sheep from Rhode Island to South Carolina.[21] Soon after the settlement sheep were breeding rapidly in Pennsylvania.[22] They already had been introduced by the Swedes on the Delaware, and were grazed in some numbers along the eastern shore of the Chesapeake.[23] The first sheep in Virginia were brought over as early as 1609, but their increase was not rapid, and it was not until 1690 that flocks were common.[24] However, in the earlier period it was not unusual for a planter to own 50 to 100 head.[24] But in estimating the influence of sheep-raising on the wool manufacture, especially in this colony and to the southward, it should be observed that they were bred for mutton rather than for wool, and the latter was not always utilized.

We have not sufficient data to estimate the number of sheep in America at different periods, and far less to deduce from this the annual wool clip used in manufactures. Towards 1650 Virginia and Massachusetts were each reported to have about 3,000 sheep, which would give a clip, supposing all were shorn for their wool, hardly exceeding 6,000 pounds, or, at a very rough guess, less than a pound for every eight inhabitants.[25] In the other colonies, outside of New England, sheep were relatively rarer. Later estimates, made when the population was more extended and the economic condition of each colony less within the cognizance of a single observer, probably have a

[15] Bishop, *History of American Manufactures*, I, 431; Brenton, "Account of New England," in *Board of Trade, Papers, New England*, IV, 33.

[16] *Cf.* also New York, *Colonial Laws*, II, 822.

[17] O'Callaghan, *Documents Relative to the Colonial History of New York*, XIV, 736–737.

[18] Coffin, *Sketch of Newbury*, 139.

[19] Great Britain, *Calendar of State Papers, America and West Indies*, 1661–1668, 343, Dec. 14, 1665; *id.*, 1675–1676, 221, Apr. 29, 1675; Richman, *Rhode Island*, 152.

[20] Massachusetts Historical Society, *Collections*, Ser. IV, vol. VII, 279; VIII, 681; *id.*, Ser. V, vol. VIII, 542; Judd, *History of Hadley*, 372; Hartford, Woolen Manufactory Company, *Manuscript Accounts*, in the Connecticut Historical Society Library; advertisement in *Providence Gazette*, Aug. 2, 1788.

[21] Weeden, *Economic and Social History of New England*, II, 590, 591.

[22] Thomas, *History of Pennsylvania*, 22–23.

[23] Holm, *Short Description of New Sweden*, 44.

[24] Bruce, *Economic History of Virginia in the 17th Century*, I, 481; *id.* I, 376.

[25] Johnson, *Wonder-Working Providence*, II, 211; Bruce, *Economic History of Virginia in the 17th Century*, I, 336; *De Bow's Review*, XXV, 85, July 1858.

wide margin of error. The difficulty of making such estimates was greater because sheep husbandry was not a specialized occupation. But there is uniform evidence that during the latter half of the seventeenth century flocks in most colonies increased in number and size relatively faster than the population. About 1704 a notable growth occurred in New England, some of the islands east of the Sound having herds of 30,000.[26] As early as 1661 the council for foreign plantations reported that there were in New England 100,000 head.[27] This number was probably exaggerated, but the rapid fall in the price of sheep to nearly one-half their former value indicates their steady multiplication in proportion to the number of inhabitants. It is supposed that before the end of the century enough wool was produced in New England for domestic manufactures.[28] In the central colonies and in parts of Maryland sheep had increased to supply local demands, though Pennsylvania imported wool from the neighboring provinces.[29] The British act of 1699 indicates that sheep-grazing was a rising industry.

Progress appears to have been relatively slower between 1700 and the outbreak of the Revolution. In some places the number of sheep declined. Various local conditions and the greater readiness with which supplies could be obtained from England probably account for this. In 1765 Lieutenant-Governor Colden, of New York, whose statements are usually conservative, reported that "all the wool in America is not sufficient to make stockings for the inhabitants, and the severe winters in North America make the production of wool in great quantities impracticable."[30] This statement continued to be repeated uncritically by subsequent writers on America for some years after the Revolution. As applying to the relation of wool production to manufactures, it needs to be qualified by many considerations and contrary observations. Indeed it probably misrepresented conditions in many of the northern colonies, and may have been applicable principally to New York, where grazing—outside of Long Island—appears to have been followed less than in the neighboring provinces. Presumably the first use of homespun wool was for stockings and other knit goods, and until this need was supplied little would be woven. Therefore the numerous fulling mills through New England, New Jersey, and Pennsylvania, as they imply the general custom of manufacturing woolen cloth in families, suggest that among the country people wool was fairly abundant.

The price of this commodity also indicates that by the end of the seventeenth century it began to fill home demands. At that time

[26] Lord, *Industrial Experiments in the British Colonies*, 129.
[27] Great Britain, *Calendar of State Papers, America and West Indies*, 1661–1668, 25.
[28] Weeden, *Economic and Social History of New England*, I, 202.
[29] Pennnsylvania Historical Society, *Memoirs*, X, 5–6.
[30] Lieutenant-Governor Colden to Secretary Conway, Dec. 6, 1765, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VII, 800.

its cost seems to have been lower in Virginia than in England, though possibly not for equal grades. Between 1670 and 1692 the price of washed wool in Virginia varied from less than 5 pence to 10 pence a pound;[31] in 1678 it was received for taxes at 6 pence in Rhode Island, and the treasurer was permitted to pay it out at 5 pence a pound.[32] Small quantities were even shipped to France.[33] But these low prices do not necessarily indicate extreme abundance of wool, as the demand must have been affected by the fluctuating activity of domestic manufactures, which were in turn influenced by other causes than the presence of raw materials. The wool from the flocks of small farmers and planters seldom entered into exchange, but was consumed within the household. Therefore the occasional and accidental surplus that reached the market was probably not sold as advantageously as a staple crop.

In Virginia, according to one authority, sheep were shorn only for the purpose of cooling them;[34] but the jealousy with which that colony at different times prohibited the exportation of wool indicates that this statement is not fairly representative. In the South the first generation of settlers, with English traditions of household economy still vividly in their recollection, probably followed the fireside arts with more industry than their successors. Later, for a time, their wool went northward, to employ the spinning-wheels of Pennsylvania and New England. And though sheep increased and prices were some times low, in the latter section wool continued insufficient for home consumption throughout the eighteenth century.[35]

The character and quality of colonial wool was not varied and improved enough to support manufactures such as at that time existed in England and Europe, even had other conditions been favorable. Combing wools must have been very scarce, though some appear to have been produced in Rhode Island and possibly in the Delaware Valley. Acrelius says that Pennsylvania wool made better stockings than that of England.[36] A Boston writer states: "The wool of our northern plantations is as good a staple but coarser than the English wool; the farther south in our colonies the wool becomes coarser even to a *lana caprina*."[37] Shortly before the Revolution an English traveler observed that American wool was not only coarse but in comparison with the English exceedingly short. He saw no wool in the colonies longer than 7 inches, while in Lincoln and Leicester it frequently was 22 inches long, and averaged 16 inches. In the southern

[31] Bruce, *Economic History of Virginia, in the 17th Century*, I, 485, quoting *Records of York County*, 1664–1672, 466; 1694–1702, 253, 410; *Records of Lancaster County*, 1690–1709, 44; *Records of Lower Norfolk County*, 1675–1676, 95.

[32] Rhode Island, *Records*, III, 22.

[33] Douglass, *British Settlements in North America*, II, 183, and note.

[34] Beverley, *History of Virginia*, 239.

[35] Douglass, *British Settlements in North America*, II, 182 (note).

[36] Pennsylvania Historical Society, *Memoirs*, XI, 153.

[37] Douglass, *British Settlements in North America*, II, 266.

colonies, on account of the scant herbage or the excessive heat, he found the wool short and hairy.[38] Probably this was due to careless husbandry, and this wool supplied a serviceable fiber for hat-makers. American graziers were studying to improve their breeds and, in spite of the British laws to prevent shipping sheep out of the Kingdom, they had contrived to procure a number of rams from England for this purpose. Moreover the short and stout American staple was fitted better for the carded woolen homespuns, suitable for frontier settlers, made in the colonies, than were the long combing wools of the mother country.[39]

At the close of the colonial period the British attitude toward sheep-raising in the colonies was changing. Previously fear lest if this industry were encouraged the colonists themselves would manufacture their wool had caused England to regard with jealousy the propagation of sheep in America. But the British wool manufacture had outgrown the home supply of raw materials, and wool was being imported from Ireland, Scotland, and Spain to the extent of 200,000 packs annually.[40] Therefore the colonies were suggested as a source of a still larger supply.

About the time of the Revolution an English writer suggested that if the British Government were "to consider the proper improvements for the colonies in North America, wool should be the first. They have already wool enough as fit for their use as if it were finer, and the only way to prevent their manufacturing it is to improve it so as to make it fit to send to England, in order to purchase their manufactures instead of making them, and to supply the place of Spanish wool."[41] The same author observed that American wool had already been sent to England, "where it sold for the price of the best." For certain purposes it was to be preferred to the English, that from the southern colonies being "of the same kind with the Spanish wool, or curled and frizzled like that."[42]

At the close of the colonial period, therefore, we find an established sheep husbandry in America, with a differentiated fiber probably answering well the needs of the settlers. In 1765 Franklin thought that within three years the supply might be made adequate to the entire home consumption.[43] But there was little or no scientific breeding, the Merino and the Saxon were yet to come, and at no time was there actually an excess of wool produced in the colonies. The production had risen slowly and sometimes inadequately to meet the simple

[38] Burnaby, *Travels through North America*, 135–136.

[39] Weeden, *Economic and Social History of New England*, II, 731; *American Husbandry*, in Callender, *Economic History of the United States*, 72.

[40] *Cf.* DeFoe, *A Plan of the English Commerce*, 156, 262–263. A "pack" was 240 pounds, *id.*, 123.

[41] Mitchell, *The Present State of Great Britain and North America*, II, 143; *American Husbandry*, I, 167.

[42] Mitchell, *The Present State of Great Britain and North America*, 142; *cf.* also Macpherson, *Annals of Commerce*, III, 163.

[43] *Examination of Doctor Benjamin Franklin, Relative to the Repeal of the American Stamp Act in 1766*, in Almon, *Tracts*, III, 3, p. 16 *et seq.*; also in British Museum, *Additional Manuscripts*, 33030, in *British Transcripts*, Library of Congress, 17, *f.* 201–269.

requirements of homespun manufactures, at length fairly supplying this demand, but never either in quality or quantity forming an incentive to a more extensive or varied industry.

FLAX AND HEMP

Flax was one of the first crops to engage the attention of the colonists, and, like hemp, throve especially on the virgin soil of new clearings. These two crops differed from wool in being favored by the British authorities.[44] They did not compete with English produce, and though their abundance might encourage the spinning of linen and rope yarns in America, it was expected at the same time to afford the British shipyards materials for sailcloth and cordage. All of the colonies produced flax in considerable quantities. Hemp grew better in the warmer climate and stronger soil of Pennsylvania than in New England, but on new ground was raised successfully as far north as Maine.[45] Its chief centers of cultivation were the same as those of flax, but the latter was raised more generally and distributed more widely. Hemp was in part a commercial crop, while flax, so far as it was raised for fiber, supplied principally household consumption.

The most important flax districts were the Merrimac and the Connecticut valleys in New England, the Hudson Valley near Albany, and the Delaware Valley, as well as northern New Jersey and the Maryland upland back of Baltimore. This crop was raised for the seed as well as the fiber, the former supplying numerous oil mills and being exported. Ireland took a large quantity of seed, partly because the finer manufactures of that country required its own flax to be cut before maturity. In the middle of the eighteenth century Connecticut was exporting flaxseed to the value of £80,000 annually, and Pennsylvania shipped 70,000 bushels.[46] Twenty years later the combined exports from Philadelphia and New York amounted to nearly 250,000 bushels, and Baltimore also had become an important shipping-point.[47] We have contemporary authority to the effect that all the fiber was spun and woven,[48] and it is not improbable that the combined elements of profit in this crop encouraged manufactures by making raw materials abundant; so that in certain sections of the colonies a surpus of homespun linen was made, above the demand for household use.

[44] Governor Berkeley, who had lost more than £1000 sterling trying to raise flax in Virginia through incompetent labor, asked the British Government to send several experienced "flaxmen" to the colony: Great Britain, *Calendar of State Papers, America and West Indies*, 1661–1668, 316; Aug. 1, 1665.

[45] Douglass, *British Settlements in North America*, II, 180.

[46] Massachusetts, *Records of the Governor and Company;* Bishop, *History of American Manufactures*, I, 335–337, 346; Franklin, "Testimony before the House of Commons in 1766," in Almon, *Tracts*, III, 3, p. 31.

[47] "Account of Shipping, Imports, and Exports," 1768–1769, in British Museum, *Additional Manuscripts*, 15485; Woolsey and Salmon, *Mercantile Letters*, Jan. 19, 1773.

[48] Franklin, "Testimony before the House of Commons in 1766," in Almon, *Tracts*, III, 3, p. 31; Bishop, *History of American Manufactures*, I, 336, Mitchell, *Present State of Great Britain and North America*, II, 145; Macpherson, *Annals of Commerce*, III, 163; British Museum, *King's Manuscripts*, 213, *f.* 52.

COTTON

The colonies were supplied more abundantly with cotton than with any other textile material except flax, and consequently it was used as a substitute both for that fiber and for wool. We are told that rags even from New England contained more cotton than those from Great Britain.[49] The sources of supply were both foreign and domestic. New England began to import cotton from the Barbados within a few years of the settlement of Boston,[50] and the regular intercourse subsequently maintained between the northern ports of the mainland and the southern islands, combined with a favorable balance of trade, made this supply continuous. As the commerce of the fishing and lumber settlements extended, consignments from Smyrna and the Mediterranean appear in colonial invoices.[51] The importance attached to the trade in cotton is indicated by the public encouragement given its early importation by Connecticut and by its regular exemption from import duties elsewhere. In 1678 New England imported from the British Islands 54,409 pounds of cotton. The only other colony having recorded imports of this commodity in the same year was New York, which received 2,290 pounds from the Barbados.[52] The relative importance of cotton in America as compared with England at this time is indicated by the fact that more than thirty years later the total imports of the mother country did not exceed 1,000 sacks annually, most of which was used for candle-wicks.[53] In 1768 the colonies imported 452,463 pounds of cotton, of which they shipped 64,822 to Great Britain, leaving 387,641 pounds of foreign cotton for home consumption.[54] In addition a few thousand pounds of Bermuda and Bahama cotton were brought into the mainland colonies in the course of the coasting trade without separate record. Massachusetts alone consumed in its local manufactures about 200,000 pounds of those imports. The West Indies not only continued during this period to furnish most of the cotton used by the northern provinces, but they shipped at least occasional cargoes to Virginia.[55]

Prior to the Revolution cotton more than sufficient for local use was not raised in any of the colonies, though in a small way its cultivation was extended over a wider range, in proportion to the area of settlement, than at the present time. In 1749 the traveler Kalm re-

[49] Judd, *Hadley*, 380–381.
[50] Winthrop, *History of New England*, II, 37, 94, 114; Massachusetts Bay, *Records*, I, 322.
[51] Bishop, *History of American Manufactures*, I, 330.
[52] "Account of Goods Entered in his Majesty's Customhouse," in British Museum, *Additional Manuscripts*, 8133 C, 234.
[53] *Report from the Committee Relating to Checked and Striped Linens*, in House of Commons, *Reports from Committees* (ed. 1803), II, 295.
[54] "Account of Shipping, Imports, and Exports," in British Museum, *Additional Manuscripts*, 15485; *cf.* Sheffield, *Observations on the Commerce of the American States*, 116.
[55] Spottswood, *Letters*, II, 105.

marked that several persons at Salem, New Jersey, had begun to grow cotton, at first with seed from the Carolinas, but later, as the plant became acclimated, with northern seed.[56] Five years earlier a premium had been offered for the most and best cotton raised on an acre in Delaware.[57] Such cultivation, so far as it was pursued with any industrial purpose, was for household use; but there may be some relation between this local provision of a homespun supply and the early rise of cotton manufactures at Philadelphia. That city was a seat for the manufacture of the primitive gins that preceded Whitney's invention.

Cotton was planted in Virginia about the time of settlement, and in John Smith's day was growing thriftily near Newport News.[58] But the comparatively small demand in England, its lower price as compared with tobacco, and the high labor cost of ginning, gave the Barbados and their neighboring islands command of the outside market. In the seventeenth century cotton was worth but 8 pence a pound in Virginia and tobacco 2 shillings.[59] During the administration of Andros, towards the close of the century, cloth manufactures were encouraged and considerable areas of cotton were planted.[60] In Spottswood's time cotton cards were common items in Virginia estate inventories. But there is no record that this crop received public encouragement, such as was given to flax, during those periods of depression and dearth of manufactures when bounties were provided for other home industries.

As early as 1731 cotton is mentioned as a crop of some importance in South Carolina, and from the beginning of the century small patches for home use were common in that province.[61] Kalm, speaking from hearsay rather than observation, mentions "great plantations of cotton" there; and about the time he wrote cotton was exported in small quantities from Charleston, though this may have been received from the West Indies, with which Charleston carried on an active trade.[62] In 1746 what was probably an experimental shipment of Virginia cotton commanded 18 pence sterling a pound in Manchester and was rated "as good as any they had."[63] One of the purposes of found-

[56] Kalm, *Travels into North America*, II, 25. It was later raised in Ohio; Hildreth, *Pioneer History of Cincinnati*, 393.

[57] Bishop, *History of American Manufactures*, I, 346.

[58] Smith, Capt. John, *Works*, 565.

[59] Bruce, *Economic History of Virginia in the 17th Century*, I, 262, note; Bishop, *History of American Manufactures*, I, 30, note.

[60] Bruce, *Economic History of Virginia in the 17th Century*, I, 466, 467. Virginia already had cotton gins, and the competition of cotton raising with tobacco cultivation caused concern to the Government: "Memorial of Sir Thomas Lawrence," in Great Britain, *Calendar of State Papers, America and West Indies*, 1693–1698, 518–519, June 25, 1695.

[61] Purry, "Description of South Carolina," in *Force, Tracts*, II, 11, p. 9; Bishop, *History of American Manufactures*, I, 323; *cf.* also South Carolina Historical Society, *Collections*, I, 209; Letter of Governor Johnston, Sept. 17, 1708, quoted in McCrady, *History of South Carolina under the Proprietary Government*, 47–481.

[62] Bishop, *History of American Manufactures*, I, 351.

[63] Mitchell, *Present State of Great Britain and North America*, 147.

ing Georgia, according to prospectuses issued at the time, was to provide cotton for British manufacturers, and as early as 1741 the local fiber was used for clothing.[64] There is evidence that during the eighteenth century the importance of cotton as a textile crop was growing in the opinion of planters, and at the outbreak of the Revolution the southern colonies turned promptly to its cultivation in anticipation of a scarcity of English manufactures soon to ensue. During that struggle cotton was raised throughout the Southern States in sufficient quantities for home use, though interruption of trade and imperfect means of transportation prevented its being shipped abroad or to the northern colonies. At this time the roller gin was in common use on plantations,[65] and though cotton did not displace flax until half a century later, the gin, with its rapid improvement, was turning the factor of labor cost in favor of that material. However, even in the South there was a territorial, and perhaps a racial, division between these two crops. Flax continued to be grown in the highlands after it was almost entirely supplanted by cotton in the lowlands and coastal country; and linen manufactures still throve among the Scotch-Irish mountaineers long after they had ceased to exist among the valley gentry.

An accessible and fairly abundant supply of cotton from trading neighbors in the West Indies, therefore, enabled the New Egland farmers to extend and vary their homespun industries, and in the South this additional textile crop was an important aid in clothing the poorer portion of the community. But it gave birth to no commercial manufactures, as did to some extent the cultivation of flax. Probably this is due to its localization as a feature of agriculture in non-manufacturing communities. Had cotton been cultivated as easily in Pennsylvania and the Merrimack Valley as it was in the Carolina coast country, Germantown and Londonderry cottons might have left a record. As it is, cotton occupies a place like wool in colonial manufactures. It engaged the industry of members of the household who otherwise might have been idle, and thus served to absorb labor in manufactures, but seldom to the extent of supplying demands beyond the family.

FISHERIES

Directly the fisheries supplied few materials to colonial manufacturers, but through the trade relations they established they indirectly gave important assistance to such industries as rum-distilling and flour-milling. Fish oil, and especially whale oil, were made in quantities more than supplying home demands, and the abundance of these

[64] "Description of Georgia," in *Force, Tracts*, II, 12, p. 4. Cotton was also cultivated, and roller gins were used in Louisiana; Lettre de M. Le Normant, 15 Decembre, 1746, in Paris, *Archives Nationales, Colonies*, F 3, 86.

[65] Anburey, *Travels through the Interior Parts of America*, II, 425.

products was an advantage to curriers and shoemakers. In the eighteenth century the manufacture of spermaceti was perfected, and upon this a candle-making industry of some importance was erected. The manufacture of candles and soap was favored also by the surplus of animal fats derived from the packing industry.

During the century and three-quarters of colonial settlement the main natural resources of the Atlantic slope were being explored, tested, and developed. For the day they were inexhaustible. There was no danger that manufactures based upon the direct bounty of nature would be hampered by the lack of raw materials. Local supplies occasionally failed. The bog ores of eastern Massachusetts, the timber close to tide water throughout New England, the fur of the more thickly settled provinces, were so lessened as to transfer industries based upon them to new districts. But, considered as a whole, no manufacture established in colonial times decreased for this reason. On the other hand, those raw materials that were not the spontaneous products of nature rapidly increased. This was especially true of wool, flax, and later of cotton. All of these probably were produced in sufficient quantities for home consumption before the close of the Revolution. The only great resource of the Atlantic slope that was not applied to industry was coal, and this was partly because technical development, even in Great Britain and Europe, did not yet permit its extensive use.

CHAPTER V

INFLUENCE OF TRANSPORTATION AND MARKETS UPON COLONIAL MANUFACTURES

Transportation as conditioning markets, 87. Transportation of raw materials, 91. Manufactures classified by markets, 92. The transatlantic market, 94. The island market, 98. The Indian trade and the fleet trade, 100. Manufactures for the home market, 100. Expansion due to growth of population, 101. Expansion of the home market due to development, 106. Articles consumed in the colonies, 108. Intercolonial trade in domestic manufactures, 112. Relative consumption of foreign and domestic manufactures, 118.

TRANSPORTATION AS CONDITIONING MARKETS

The isolation of the colonists, both local and international, was greater than can now be realized. Cut off by political regulations from many sources of natural trade with European countries and with other American colonies, and separated by a sea voyage of several weeks from what are to-day near neighbors, it often was impossible for colonial producers to estimate the demand for their commodities abroad or to insure themselves a profitable exchange. In 1734 Governor Cosby wrote: "In case of Spain and Portugal the sales of flour and bread are hindered because the intelligence of a demand reaches us so late that the markets are supplied before our vessels come over."[1] Similar conditions subjected the nascent industries of the colonies to uneven and often destructive competition. Though they were occasionally helped by high prices, caused by a scarcity of competing imports, at other times their small capital was exhausted in a struggle with low prices, due to an overstock of European merchandise. Goods sometimes sold in America for less than they cost in England.[2] Equally disadvantageous to the colonial tradesman and manufacturer was his isolation in the home market. If he were at an inland town or one of the less-frequented ports there was no regular service by which he could keep informed as to prices and demands for his wares outside the immediate neighborhood. This lack of commercial information, and the ever-present difficulty of getting goods to market, caused many colonial industries to stagnate as soon as the volume of their production exceeded the demand of their immediate vicinity. Such conditions checked the growth of centralized industries even in the northern

[1] Governor Cosby to Lords of Trade, Dec. 6, 1734, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VI, 19.

[2] Governor Nicholson to Board of Trade, in Great Britain, *Calendar of State Papers, America and West Indies*, 1697–1698, 391.

colonies, where township organization and closer settlement afforded at least a community market; and in the plantation colonies they entirely prevented the rise of manufactures. American markets were so dispersed that they were commercially about as remote from the centers of colonial industry as from the ports of Great Britain. English merchantmen were surer of return cargoes than were the coastal vessels that distributed colonial merchandise from settlement to settlement; and as the goods brought to America were far less in volume than those carried eastward, so that ships often came to the colonies in ballast, they formed back-loads burdened with relatively lighter freights.[3]

Nevertheless there were two influences flowing from transportation which were an advantage to colonial manufacturers. American colonists were the distributors of British merchandise, their coasting vessels carrying goods from the warehouse cities to the villages and plantations of the seaboard. They were thus able to gauge in the first instance the tastes and needs of consumers and to supply with the products of local industry any default in importations. Colonial manufactures thus became supplementary to those of Great Britain in constantly widening circles of distribution. In the second place, the cost and delays of land transportation protected the neighborhood industries of inland settlements from competition and further stimulated such industries by lessening the profit of agriculture. This is instanced by the relative development of Pennsylvania and New York in the eighteenth century. Both were colonies having similar natural resources—timber, iron ore, and wheat lands. New York was a river settlement, and it was estimated that three days' labor would put the produce of any farm in the colony at a boat-landing, whence two or three men could navigate to New York a cargo that could be brought to Philadelphia, from the Pennsylvania back country, only by 40 wagons, 160 horses, and 80 men. The average cost of carrying a bushel of wheat 100 miles was estimated in New York at 2 pence and in Pennsylvania at 1 shilling. The profits of farming in New York were said to exceed those in Pennsylvania by 30 per cent.[4] Partly, perhaps largely, for this reason, Pennsylvania became a seat of diversified industries and home manufactures, while New York remained chiefly a commercial and agricultural colony until the end of the colonial period. The respective destinies of two American States were determined at this early date, and were governed then, as they were later, chiefly by transportation influences.

So long as inland traffic was conducted solely along roads and rivers radiating from the principal ports, it opened a market to British and colonial manufactures on practically equal terms. But when overland routes were established, subsidiary centers of manufacture—

[3] Weeden, *Economic and Social History of New England*, I, 369–370.
[4] *History of the British Dominions in North America*, II, 77, 78.

small in their way, but not unimportant relatively to the population —sprang up along their course, and at some competitive advantage supplied purchasers in their own vicinity and the more remote interior. Particular industries thus rose at Worcester and Springfield between Boston and Albany, at Albany itself on the highway to Canada and the Indian country, at Lancaster, Pennsylvania, in the north Maryland towns, and at Winchester and Salem on the great trail southward into the Carolinas. From Pennsylvania, the colony of the Conestoga wagon and land freighting, two routes left Lancaster, through Chambersburg and Cumberland westward, and through Hagerstown, Winchester, and the Valley of the Virginia southward. Along the latter, in the wake of the Scotch-Irish and German settlers, wended pack trains for the frontier laden with salt and with Pennsylvania iron and linen.[5] Wagon travel came slowly. The first team was driven from Connecticut to Rhode Island in 1722,[6] more than a century after the settlement of New England, and it was not until 1789, the year of the adoption of the Constitution, that a freight road was open to the Monongahela.[7] During the Revolution settlement was driven inland by the incursions of the British along the coast, new interior highways were opened and old ones improved, and capital was diverted from sea trading to internal development.[8]

An increase of inland and ocean freights affected differently manufactures for export and those for home consumption. Generally a rise in the cost of carriage depressed the former and stimulated the latter; because exports brought a smaller return and imports cost more when freights were high, and people therefore turned their attention from making things to be sold abroad to making things to be used at home. Ocean freights upon tar were so heavy, as compared with those between the Baltic ports and England, that American producers were at a disadvantage in the British market. In 1699 this freight was about £4 sterling a ton in times of peace and £6 in time of war. Insurance with convoy was 9 per cent. In 1715 it cost £4 per 1,000 feet to carry lumber from New England to Great Britain.[9] The freight on iron, on account of its less bulk, was considerably lower; or 7s. 6d. a ton from Virginia to Bristol or London in 1732.[10] Rates must have fallen decidedly in times of peace, for in 1736 sugar was carried from Boston to Bordeaux for £2 10s. a ton, though the freight on this commodity normally would be as much or more than that on tar.[11] We have seen

[5] Bittinger, *Germans in Colonial Times*, 119.
[6] *Rhode Island Historical Magazine*, VI, 19.
[7] Bishop, *History of American Manufactures*, I, 232.
[8] Chastellux, *Travels in North America*, II, 237; *cf. id.*, I, 54, translator's note.
[9] Lord, *Industrial Experiments in the British Colonies*, 61, 62, 72. The last rate continued between New England and Great Britain in 1767; Governor Tryon to Lords of Trade, Feb. 2, 1767, in British Museum, *King's Manuscript*, 205, in *British Transcripts*, Library of Congress, 23.
[10] Byrd, "Progress to the Mines," 349, in *Writings*.
[11] Weeden, *Economic and Social History of New England*, II, 611.

that the volume of traffic westward was less than that eastward. This was so true that it was profitable sometimes even to ship coal and limestone from England and the West Indies to the colonies, and Newcastle coals were not infrequently cheaper than wood at Annapolis, New York, and Boston.[12] Colonial merchants complained that their British competitors had better back-loading to the sugar colonies than themselves, though this is to be doubted. But though sugar, rum, and molasses were diverted from the West Indies to North America in part by the cheap freights to the northern colonies, the extent of this commerce, favorable to refining and distilling, was somewhat checked by the higher eastbound freights across the Atlantic. The lack of backloads from Europe stimulated the sale abroad of colonial vessels, because owners taking over a vessel with bulky cargo thereby avoided a profitless voyage on their return.[13]

Ocean charges, however, constituted only a fraction of the freight burden borne by colonial commodities and imports. In 1667 the freight from Long Island and Connecticut to Boston, whence produce was then exported, was £1 10s. a ton.[14] It cost a shilling a bushel to carry wheat from Northampton to Windsor, 2 pence from there to Hartford, and 6 pence from Hartford to Boston, or 1s. 8d., in colonial currency, for the entire journey. This was nearly one-third the market price. In 1673 grain was carried from Hadley to Hartford for from 4 to 6 pence a bushel, and goods brought back in return for 12 shillings a ton. Meanwhile to ship a barrel of pork or flour from Hadley to Hartford cost 3s. 6d. to 4s., and from thence the freight to Boston was about 3s.[15] A century later coastwise freight on iron from Baltimore to Massachusetts was about $4.60 a ton, and it cost $2.60 a hogshead to bring rum by land from Philadelphia to Baltimore.[16] The cost of transporting such commodities was less than one-eighth of the market price. This explains why agricultural produce was exported so largely in the form of manufactured provisions, for the average saving of freight amounted to 10 or 20 per cent of the proceeds from their sale.

Franklin, in his plea for opening the Ohio lands to settlement, presented figures to show that by combined land- and water-carriage, even at the high rates then prevailing, such agricultural commodities as flax and hemp could be exported, and British manufactures imported, at a profit; and he maintained that those rates were then less than was "daily paid in London for the carriage of coarse woolens, cutlery,

[12] Byrd, "Progress to the Mines," 353, in *Writings;* Kalm, *Travels into North America*, I, 200; Weeden, *Economic and Social History of New England*, II, 532; Pearse, *History of Iron Manufactures in America*, 37–38.

[13] *Cf.* Belknap, *History of New Hampshire*, III, 304.

[14] Great Britain, *Calendar of State Papers, America and West Indies*, 1661–1668, 533.

[15] Judd, *Hadley*, 75, 93, 94.

[16] Woolsey and Salmon, *Manuscript Mercantile Letters*, March 9, 1775; Feb. 21, 1775.

ironware, etc., from several counties in England."[17] This was not a disinterested plea, as Franklin was seeking land grants in the interior; but it may have accorded with facts. Yet the high cost of land carriage did constantly stimulate and protect the manufacture in America of articles which commonly were imported from Great Britain, and it caused a dispersion throughout the country of manufactures by which bulky raw materials were converted into more valuable commodities for exchange.

TRANSPORTATION OF RAW MATERIALS

The heavy cost of transporting raw materials also hampered industry and made large establishments, except in a few favored localities, impossible. Even ships were built inland in the midst of the timber from which they were made, and transported to water in parts, there to be reconstructed;[18] houses were exported ready framed; logs and lumber were shaped into rude, temporary ships, and sailed across the Atlantic to England; iron ore was carried in leather bags on the backs of horses from the mines to the furnaces in northern New Jersey and even over the Orange Mountains to Newark.[19] Generally a furnace or a mill could be established profitably only where there was a favorable conjunction of water-power and water-carriage, and dependence on small water-powers often made it necessary to place a furnace and the accompanying forge at different points. Rich mines and ample supplies of flux and fuel therefore remained unutilized unless they were near such situations. It was considered remarkable that Livingston brought ore 12 miles to Ancram forge, or that Spottswood, in Virginia, carried his ore and iron still longer distances.[20] In 1725 the manager of the Principio Company wrote to one of the English owners, that although ore was brought to the furnace by water, "yet that charge by water is as dear as getting and carriage both together in England."[21]

The necessity of having water transportation to market, which meant the coast, and the difficulty of assembling materials from a distance, therefore decided the location of all important manufactures. But before the end of the colonial period some industries were surviving and even thriving after the original reason for their location in a particular district had ceased. The most notable instance of this was the iron manufactures of eastern Massachusetts. Established origi-

[17] Franklin, *Report of the Lords Commissioners for Trade and Plantations with Observations and Remarks*, 71, 72; also in Franklin's *Works*, v, 506–507.

[18] Crévecœur, *Lettres d'un Cultivateur Américain*, III, 503, 517; Weeden, *Economic and Social History of New England*, II, 765.

[19] Bishop, *History of American Manufactures*, I, 541; New Jersey Historical Society, *Proceedings*, Ser. 2, VI, 149.

[20] Bishop, *History of American Manufactures*, I, 527, 530–531; Byrd, "Progress to the Mines," 359, in *Writings*.

[21] John England to Joshua Gee, Apr. 25, 1723, *Principio Papers*, in Maryland Historical Society Library.

nally to use the bog ores of the vicinity, and having founded upon these resources reproductive manufactures, towards the end of the eighteenth century these establishments were using New Jersey ores to supplement local supplies and to improve their product, and were employing five times as many pigs from the same colony and its neighbors for casting ironware and refining into bars as were obtained from local smelters.[22] The Spottswood furnace used limestone from Bristol as a flux. The furnace linings at New Haven[23] and Principio appear to have been of English stone,[24] and Spottswood's furnace was lined with Stourbridge brick.[25] For all these articles the sea must be accessible. But cotton, fur, hides, leather, and in spite of the legal prohibition some wool, found their way to and from interior manufacturing points, though seldom or never in large quantities.

MANUFACTURES CLASSIFIED BY MARKETS

The manufactures of the colonies may be classified in relation to their market as homespun, domestic-commercial, and foreign-commercial. These terms are not in all cases mutually exclusive, but they describe the dominant consuming area each class of industries served.

Homespun manufactures did not enter into exchange except more or less accidentally. The chief homespun industries were carding, spinning, and weaving wool, flax, hemp, and cotton, for clothing and various household uses. Relatively to these, in the opinion of the time, other home manufactures were unimportant, yet the latter supplied many wants that are to-day served by large and highly organized industries. Hardware, tools and implements, furniture, clothing, shoes, caps, and bedding were made in the family. Many southern plantations conducted, with slave labor, household manufactures sufficiently extensive to supply what under a different labor system would have been a community market; and at no time, unless at the very earliest period, was the consumption of homespun manufactures confined exclusively to the family that made them As soon as such articles entered neighborhood exchange, and became to that extent domestic-commercial, they began to be specialized and localized at points of advantageous production. Though this process was slow, before the end of the colonial period most homespun industries had become domestic-commercial in some parts of the country. On the other hand,

[22] Bishop, *History of American Manufactures*, I, 548; Rhode Island, *Proceedings of Assembly*, Aug. 1758; *Report of the Committee on Iron Manufactures in Rhode Island*, in *Acts and Resolves*, Aug. 1758, 43; *History of the British Dominions in North America*, I, 219–220; Pennsylvania Historical Society, *Memoirs*, XI, 165–167.

[23] Pearse, *History of Iron Manufactures in America*, 37, 38.

[24] John England to James Farmer, Apr. 25, 1723, *Principio Papers*, in Maryland Historical Society Library.

[25] Byrd, "Progress to the Mines," 377, in *Writings; cf.* Corning, *The First Iron Works in America*, 7.

however, they retained their primitive character in remote districts long after the Revolution, and even after the Civil War.

Domestic-commercial industries were not developed exclusively from homespun. Brick and pottery, hollow ware, and bar iron were made in the colonies for local consumption at a very early date. Certain agricultural implements, including scythes, were among the first manufactures of Massachusetts. Comestibles, such as bread, beer, cider, rum, chocolate, and refined sugar, were manufactured for domestic markets. Printing was necessarily domestic-commercial; so was the manufacture of glass and paper as soon as these industries were introduced. The same is true of tanning, saddlery, and shoemaking. The manufactures of cottons and woolens at Rowley, of linen at Londonderry and Germantown, and of knit goods at the latter place appear to have been begun with the idea of supplying both the neighborhood and more distant markets. Soap and candles were made by people who followed this occupation exclusively. Provisions were produced for local exchange as well as for foreign trade.

The chief foreign-commercial manufactures were lumber, ships, iron, pitch, tar, turpentine, flour, salt provisions, potash, and rum, the latter, like iron, supplying markets both at home and abroad. Whale oil was refined for export, and soap and candles, as well as hats, brick, and pottery, were sent to the island colonies.

Practically all the markets for colonial manufactures, outside the province within which they were situated, were reached by sea. Products shipped from one colony upon the mainland to another were technically exports, and the political and commercial relations of those colonies to each other were no closer in theory than the relations of any one of them with Jamaica or the Barbados, or with the mother country itself. For convenience, however, in order to avoid a distinction that would apply only to the colonial period, the thirteen colonies are considered here a domestic market, and their trade is termed intercolonial, while England and the West Indian colonies are treated as part of the foreign market.

In relation to manufactures the foreign market fell into two divisions, the transatlantic countries and the islands. Of the two, the islands were the more important. Known at the time as the "Sugar Islands" and the "Wine Islands" respectively, the West Indies and the neighboring mainland settlements supplied the most profitable trade to the colonists, while the Azores, Madeira, and the Canaries supplemented this market with a ready demand for pipe staves and provisions. The foreign market took principally products of extractive and primary rather than of reproductive manufactures, especially lumber and naval stores, flour, and salted meats. But this stream of trade carried with it bread, rum, and some articles of handicraft.

THE TRANSATLANTIC MARKET

Great Britain was the chief transatlantic market of the colonists. In the order of development, this market encouraged in America the manufacture of lumber, ships, naval stores, and iron. The south-European countries took all of these things except iron and afforded a market for provisions. Trade statistics are too defective to give much information as to the volume of this demand. England consumed more imported iron and forest products than the colonies supplied, but the competition of home producers and of the Baltic countries caused British prices to fluctuate, and sometimes to fall too low to give a profit to American manufacturers. This condition seems to have affected the lumber trade least of all, partly because the market was wider—extending to the islands—and because labor was relatively a less important item in the cost of sawing boards and timbers by water-power than in that of making tar, smelting iron, or building ships.

Lumber formed part of the earliest cargoes from Virginia and Plymouth to the mother country. In 1671, when its population hardly exceeded that of a good-sized village, New Hampshire annually shipped abroad, though not entirely to transatlantic countries, 20,000 tons of boards and staves, besides 10 ships laden with masts.[26] That colony and Massachusetts conducted a lucrative timber trade with Spain and Portugal. About 1700 a Salem ship loaded for these countries with "12,000 feet of the noblest plank that ever was seen in America"; and between 1712 and 1718 New Hampshire shipped to Lisbon and Cadiz, in addition to over 135,000 staves and large quantities of dressed timber and rafters, nearly 100,000 oak planks and two-thirds that quantity of pine planks and boards.[27] In 1739 a Piscataqua merchant had large contracts for timber with the Court of Spain,[28] and the lumber trade with southern Europe continued active until 1765, when it was prohibited by Parliament.[29]

Market conditions, reënforced by political regulations, affected the relative profit of exporting timber in a manufactured or in an unwrought state. When, in 1722, Great Britain removed its duty upon colonial lumber and timber, the effect was to increase the exportation of the latter.[30] The premium upon masts and spars was a further incentive for shipping direct from the forest, and a growing demand from Spain and Portugal for the same class of timber, helped a movement already under way; therefore, about this time it was found better to

[26] Great Britain, *Calendar of State Papers, America and West Indies*, 1669–1674, 294, Dec. 14, 1671; *cf.* also Bishop, *History of American Manufactures*, I, 102.

[27] Lord, *Industrial Experiments in the British Colonies*, 107, quoting William Cornes to Board of Trade, Dec. 15, 1718, *Board of Trade, New England*, W. 63.

[28] Belknap, *History of New Hampshire*, II, 182.

[29] Massachusetts, *Archives*, LIX; Massachusetts Bay, *Records of General Court*, May 30, 1765; 6 George III.

[30] Lord, *Industrial Experiments in the British Colonies*, 103.

export hewn logs than to saw them into boards.[31] The market for riven timber, being broader, was probably also steadier than that for sawed lumber. Ireland took coopers' stock from the colonies, to use in packing butter and salt provisions. During 1768 over 2,200,000 staves were shipped from the colonies to that island, and about double that number to Great Britain. Pennsylvania supplied most of the former trade and Virginia most of the latter; Ireland, the same year, took over 300,000 feet of boards and planks, while Great Britain imported about 388,000 feet of oak plank and over 2,275,000 feet of pine planks and boards. Though the central and southern colonies supplied most of the riven timber, Massachusetts alone, including the province of Maine, shipped considerably over one-half of the sawed lumber. North Carolina, with 50 sawmills in operation on the Cape Fear River, ranked second of the colonies in this branch of the transatlantic trade.[32]

The English and European market for colonial vessels seems to have determined the prosperity of ship-building, although the aggregate home demand, for the fisheries and the coasting trade as well as for over-sea traffic, usually must have exceeded the demand from abroad. In 1676 it was considered not remarkable for New England builders to receive orders from Great Britain for 30 ships in one year, though frequently foreign wars greatly reduced these commissions.[33] The English market for colonial shipping was strengthened not only by the fact that vessels could be built cheaply in America, but also by favorable conditions of exchange. On account of the regular balance of trade against the northern colonies, English merchants sent cargoes of merchandise to America, with the proceeds of which they built a ship and freighted it with lumber for Great Britain or southern Europe.[34] Colonial undertakers also built on speculation for the foreign market. In 1721 it was estimated officially that the greater part of the tonnage built in the northern colonies was on orders from British merchants.[35] As early as 1697 Bristol merchants built ships in Virginia.[36] About the year of settlement a shipyard at Philadelphia received large foreign orders, and in 1718 Jonathan Dickinson wrote from Pennsylvania: "Here is a great employ for ship work for England. It increases and will increase."[37]

[31] Bourne, *Wells and Kennebunk*, 302.

[32] *Account of Shipping, Imports, and Exports, 1768–1769* (Chalmers Library), in British Museum, *Additional Manuscripts*, 15485.

[33] Hutchinson, *Papers*, II, 232.

[34] Wentworth to Board of Trade, in British Museum, *King's Manuscripts*, 205, 304; Governor Bernard to Board of Trade, *King's Manuscripts*, 205, 399; *History of British Dominions in North America*, I, 216; Gee, *Trade and Navigation of Great Britain*, 114; Weeden, *Economic and Social History of New England*, II, 544.

[35] O'Callaghan, *Documents Relative to the Colonial History of New York*, V, 598.

[36] Hartwell, Chilton, and Blair, *Present State of Virginia*, 1696–1697, 4, quoted in Bruce, *Economic History of Virginia in 17th Century*, II, 438.

[37] Thomas, *History of Pennsylvania*, 40; Bishop, *History of American Manufactures*, I, 70–71.

The manufacture of tar, pitch, turpentine, and similar naval stores began in America before the British bounties were established, but probably such early supplies were consumed mainly by local dockyards. After 1700 the English market, under the influence of government encouragement, became the most important factor governing the production of these commodities. Between 1701 and 1718 the shipments of tar from America to England rose from 177 to 82,084 barrels; at the latter date colonial tar constituted nearly 90 per cent of the British imports.[38] In 1719 Governor Johnson, in a letter to the Board of Trade, reported that South Carolina the previous year had supplied for the use of the British navy 32,000 barrels of tar, 2,643 barrels of pitch, and 473 barrels of turpentine. Five years later the annual export of pitch, tar, and turpentine, from that colony, was stated to be 52,000 barrels. Thereafter the increase in these commodities was not so rapid.[39] In 1768 the total importations into Great Britain from the colonies were somewhat over 135,000 barrels.[40] The growth of this branch of manufacture in America was limited directly by foreign demand and by competitive conditions in the transatlantic market.

Iron was the last manufactured commodity to become an important item in our colonial exports to England. This trade differed from that in lumber, ships, and naval stores in that there was a reciprocal movement of this article in its various forms, imports and exports occurring simultaneously. Small quantities of bar iron were shipped from Massachusetts to England during the seventeenth century, but there was no regular eastbound commerce in this article.[41] As yet the colonists did not manufacture enough for their own consumption, but depended upon bars imported from Spain and England and hardware from the latter country. During the following century also, though the colonies became iron exporters, they continued to buy bar iron from Great Britain. After 1710 we have statistics showing a gradual increase in importation, but with wide variations from year to year. The increase appears to have affected Pennsylvania less than the other colonies and is confined mainly to wrought-iron products, the imports of bars being about the same in 1735 as in 1711. In 1732, when New England imported a maximum amount of bar iron (over 413 tons), its imports of wrought iron were less than 4 tons, though bars constituted only 29 per cent of the total colonial-iron importations. The maximum imports of the Carolinas occurred in 1713, when 27 tons of bar iron and 14 hundredweight of wrought iron were brought

[38] Public Record Office, *Colonial Office Papers*, 390, No. 12; Board of Trade, *Trade Papers*, No. 23, pp. 105–108, quoted in Lord, *Industrial Experiments in the British Colonies*, Appendix B.

[39] McCrady, *History of South Carolina under the Proprietary Government*, 622; McCrady *History of South Carolina under the Royal Government*, 60–61.

[40] "Account of Shipping, Imports, and Exports, 1768–1769" (Chalmers Library), in British Museum, *Additional Manuscripts*, 15485.

[41] American Iron and Steel Association. *Bulletin* XXXVI, 92, June 25, 1903; Corning, *The First Iron Works in America*, 7; Aspinwall, *Notorial Records, 1644–1651*, p. 18 (from end); *Lynn Iron Works Papers, 1650–1685*, No. 26.

from Great Britain. Two years later this colony's imports fell to less than 2 tons, and thereafter rose to 10 tons on but two occasions. After 1725 Pennsylvania seldom received from abroad over 2 tons of bars and a ton of wrought iron annually. In 1718 Virginia and Maryland together imported 26 tons of bar iron, but for a quarter of a century their imports reached 10 tons on but three other occasions. These statistics end with 1735; but at that time the exports of iron to England were nearly double the amount received by the colonies from the mother country.[42] A small consignment of 3.5 tons of bar iron was exported from Maryland or Virginia in 1718. Statistics are a blank thereafter until 1728, when we find exports, chiefly from these two colonies, rising rapidly from 1,133 tons of pig that year to 2,250 tons the second year thereafter. Bar iron began to be exported again in 1735, but remained a relatively unimportant item of trade until 1764, when the shipments for the first time exceeded 1,000 tons annually. They rose to nearly double that amount five years later. In 1771, the year of maximum exports of both pigs and bars, the former amounted to 5,303 tons and the latter to 2,222 tons. These exports, small as they appear in comparison with modern figures, formed a large fraction of the total colonial product. Some of the principal furnaces in America were erected specifically to supply the English market; and though it can not be said that the prosperity of this industry was based upon a foreign demand to the same extent as the manufacture of lumber and naval stores, that demand greatly assisted its progress.

Towards the close of the colonial period American manufactures began to reach England and Europe in slightly greater variety. In 1768 the colonies shipped across the Atlantic and to the Azores, in the wake of 4,000 tons of whale oil, 11,000 pounds of soap and a few hundred pounds of sperm candles; also 1,344 tons of potash and 201 tons of pearl ash; and more than 10,500 tons of bread and flour and 150 tons of salted beef and pork. There also were exported to the same destinations, in round numbers, 281,000 gallons of rum, of which a portion doubtless was distilled in the West Indies.[43] For none of these manufactures, except oil and potash, were the transatlantic countries more than a subsidiary market. The trade in manufactured provisions was supported mainly by the tropical islands, which during the last century of colonial dependence had more influence than any other section of the outside world upon the industrial development of the North American settlements.

[42] Bishop, *History of American Manufactures*, I, 625, 629; French, *Iron Trade of the United States*, 4, 5, 6; Swank, *Iron in All Ages*, 517.

[43] "Accounts of Shipping, Imports, and Exports, 1768–1769" (Chalmers Library), in British Museum, *Additional Manuscripts*, 15485.

THE ISLAND MARKET

The sugar islands of the West Indies, not only those belonging to Great Britain but also the colonies of France and Spain—with which the northern settlements conducted an active illegal or tolerated trade—afforded a market practically uniform in character. This influenced colonial manufactures in three ways: by a direct demand for certain commodities, by supplying raw materials for manufacture, and by providing a supply of coin, facilitating exchange and through this the diversification of industry. This market was supplemented by the wine-producing islands of the East Atlantic, and in the chain of commerce thus created was comprehended the slave trade with Africa.

The West Indies took in varying quantities almost every product of colonial industry, and a complete record of this trade might reveal the history of commercial manufactures in America of which all knowledge has been lost. The tropics demanded lumber in its finished forms, and therefore this market was more favorable to manufactures than that of England, where the call was mainly for unwrought timber. An active demand existed in the sugar countries for containers for sugar, molasses, and rum, which were shipped in the form of staves, hoops, and heading, and sometimes made into barrels on shipboard during the journey southward. This trade began with the Wine Islands during the first decade of Virginia settlement and, except for the vicissitudes of war, continued uninterrupted through the following 150 years; with the West Indies its origin dates at least from the first New England settlements. Shortly before the Revolution the annual shipment of staves to the sugar colonies was between 11,000,000 and 12,000,000. Closely associated with this branch of the lumber trade was the demand for building materials. Ready-framed houses were sometimes shipped from New England and from Louisiana to the English and French Islands.[44] The rapid deterioration of such structures in the tropics made the request for new materials almost constant. In 1768 the West Indies took from the northern colonies nearly 39,000,000 shingles and over 35,000,000 feet of boards and plank, besides scantling and other sawed timber. New York built ships for the Barbados and Jamaica merchants. One of the earliest exports from Virginia was a cargo of brick to the Bermudas, and many New England invoices to the West Indies mention this commodity.[45] In 1768 the total shipments of brick from North America to this destination were over 1,500,000.[46]

Equally important with the trade in lumber and building materials

[44] *History of British Dominions in North America*, II, 191.

[45] Smith, Capt. John, *Works*, 682; Weeden, *Economic and Social History of New England*, II, 757, 780.

[46] "Account of Shipping, Imports, and Exports, 1768–1769" (Chalmers Library), in British Museum, *Additional Manuscripts*, 15485; Boston Merchants, *Account of the State of Trade*, 26.

was that in manufactured provisions, of which in the year just mentioned 135,000 barrels of bread and flour and over 25,000 barrels of beef and pork were shipped to the island colonies. Butter, Rhode Island cheese, lard, and pickled oysters contributed somewhat to this branch of traffic.[47] Merchant milling, next to lumbering the most important and profitable export manufacture of the colonies, was, therefore, mainly dependent on this market, but its influence extended farther, for a current of trade thus started bears with it commodities that of their own momentum might not reach distant consumers. In 1768 there were shipped to these islands nearly 6,000 barrels of naval stores, 220 tons of oil, between 150 and 200 tons of bar and wrought iron, and 3,548 boxes of soap. Possibly the last was not solely of colonial manufacture. The West Indies also took annually from the colonies over 500,000 pounds of sperm and tallow candles. New England cider, Philadelphia beer, New Jersey pottery, New York and Carolina hats, Virginia leather, Massachusetts shoes, colonial furniture and vehicles, all found their way southward in the wake of the lumber and provision traffic.[48] The progress of the latter manufactures in America was not dependent upon the West Indian market; but though that market was quite subsidiary to local demands in causing their development, it promoted the differentiation of colonial industry already occurring in response to other conditions.

The principal returns from the West Indian trade were sugar, molasses, rum, cotton, dye and cabinet woods, and coin. At the northern ports molasses was converted into rum and sugar was refined. Most of the cotton and some part of the dye and cabinet woods were used by colonial manufacturers. The coin, as already mentioned, stimulated trade; and while it was used mostly to pay for European and British manufactures, its presence nevertheless favored local industries, for ready money and manufactures go together. Moreover, in Rhode Island silversmithing and the manufacture of jewelry received their first encouragement from the supply of bullion provided by the active West Indian trade.[49] As this commerce extended to the coast of Africa, whence slaves were supplied to the sugar planters, it afforded a market for rum, and, in a lesser degree, for the iron bars used as currency on the Guinea Coast. The trade with the Wine Islands, on the other hand, stocked the colonies so plentifully with Madeira that this was accounted some discouragement to colonial brewers and cider-makers;[50] but in

[47] Kalm, *Travels into North America*, I, 186, 187.

[48] *E. g.*, beer, Bishop, *History of American Manufactures*, 250, 260; pottery, Barber, *Pottery and Porcelain of the United States*, 55; hats, O'Callaghan, *Documents Relative to the Colonial History of New York*, V, 744; Chalmers, *American Colonies*, II, 119; leather, Bruce, *Economic History of Virginia in 17th Century*, II, 326; shoes, Weeden, *Economic and Social History of New England*, I, 184; furniture, Timothy Orne, *Manuscript Mercantile Papers*, 1736.

[49] *Rhode Island Historical Magazine* [Newport Historical Magazine], II 187, Oct. 1881.

[50] Kalm, *Travels into North America*, I, 201; Pennsylvania German Society, *Proceedings*, XIII, 82–83.

early times, among the returns from the latter traffic were Spanish wool and salt, important industrial commodities for the colonists.

THE INDIAN TRADE AND THE FLEET TRADE

The fishing and merchant fleet on the coast and the Indians on the frontier also made demands upon colonial manufactures. The fleet took provisions, principally rum and beer; but various ship supplies—anchors, cordage, and possibly sailcloth—were made for this market. The rough, durable homespuns of the colonists appear to have been in request by the fishermen in preference to imported fabrics,[51] and there is at least a suggestion that they found their way to the depots of the western fur trade.[52] The Indians trafficked for colonial rum and, like the frontiersmen, preferred the leather goods, axes, and firearms made in America. In the lists of wares supplied the eastern Indians by the Massachusetts truck-masters, in 1703, in addition to woolen and cotton cloth, knives, combs, thread, and shirts, the following articles are mentioned, all of which may have been of colonial origin: Indian meal, tobacco (sold by the fathom), biscuits, pork, hats, kettles, axes, and hoes.[53] Kalm says the kettles sold the Indians were of copper or brass, as iron was too heavy and fragile to be used on their journeys.[54] English goods, being cheaper than French manufactures, were employed for the Indian trade even in Canada and Louisiana, in spite of the stringent laws enacted by New York to prevent the sale of British manufactures through Albany to the French.[55] On the southern Mississippi these traders brought British goods from New York and Philadelphia merchants to traffic with the Creeks, Choctaws, and other southern tribes.[56] Such supplies at times, and usually in case of certain articles, were supplemented by the products of colonial industry, which thereby found their way into the western country more extensively than they otherwise might have done.

MANUFACTURES FOR THE HOME MARKET

While over-sea markets stimulated in the colonies the growth of staple manufactures, which were coeval with the settlements or arose with the beginning of agriculture, and which, except in case of iron, did

[51] *American Museum*, v, 360; *cf.* Mitchell, *Present State of Great Britain and North America*, 340 (note).

[52] Massachusetts, *Archives*, LXXXIX, 82, quoted in Weeden, *Economic and Social History of New England*, II, 679.

[53] Massachusetts, *Archives*, CXIX, 214.

[54] Kalm, *Travels into North America*, II, 290–295, 393.

[55] Weeden, *Economic and Social History of New England*, II, 507; O'Callaghan, *Documentary History of New York*, I, 488–489; *Documents Relative to the Colonial History of New York*, V, 577, 643, 687; Cunningham, *Growth of English Industry, Modern Times*, I, 281; Wilson, *The Great Company*, 214. When strouds sold at Albany for £10 apiece, they sold in Montreal for £25; "Mr. Golden's Memoir on the Fur Trade," Nov. 10, 1724, in O'Callaghan, *Documents Relative to the Colonial History of New York*, V, 730.

[56] "Account of the Progress of the Colony of Georgia," in *Force, Tracts*, I, 5, p. 46.

not greatly vary from that time until the end of the colonial period, on the other hand, the home market afforded increasing inducements to diversified industries. Though the foreign market was a growing one, its expansion during the seventeenth and eighteenth centuries did not keep pace with the increased production of the North American provinces. Prior to the troubles that inaugurated the Revolution, trade experts had begun to point out that the West Indian market, which conditioned the commercial prosperity of the colonies under the existing system, could not, for physical reasons, extend so as to absorb the produce and manufactures of the rapidly multiplying settlements upon the mainland. On this account, and because it was forseen that as the frontier was pushed westward increasing difficulty would attend the exchange of merchandise between America and Europe, it was recognized that the prosperity of the colonies depended upon some uninterrupted industrial transition that would enable them to maintain a favorable—or at least not a ruinous—balance of trade with the mother country. Meanwhile this transition was occurring, though not in the way sought by British merchants. As the ratio of the home to the foreign market continued to grow, manufactures for home consumption began, slowly but appreciably, to supplant manufactures of cruder commodities for export and the predominant production of raw materials.

Manufactures thrive better with an expanding than with a stationary market, and expansion remarkable beyond that of most other nations has been a chief characteristic of American consumption from the founding of Jamestown and Plymouth to the present time. The growth of population and consequent flow of settlement westward into new country, where the entire energy of the people was absorbed in clearing land and making homes, favored the extension of domestic manufactures adapted to the peculiar needs of these pioneers. Certainty of an increasing demand for their productions gave confidence to the projectors of new undertakings. These same conditions exercised a counteracting influence, by diverting capital and labor from manufactures to the development of unexploited resources, but the total effect, as evidenced by history, has been favorable to industrial growth.

The expansion of the domestic market during the colonial period may be viewed under three aspects: the growth of population, the development of natural resources, and the rising standard of living.

EXPANSION DUE TO GROWTH OF POPULATION

Comparisons between present and past conditions, that assign absolute values to different economic influences, sometimes overlook the important fact that the respective weight of these influences in historical development can only be judged by observing their simul-

taneous operation. Therefore, when we say that the population of what was then a province and is now a powerful State did not in the seventeenth century exceed that of a country town or of a progressive rural district at the present time, it does not follow that the relative economic importance of that population was not at the early period manifold what it would be in the twentieth century. In 1699 the 700 families in New Hampshire already had made New England famous for its timber products. New Amsterdam probably did not have 5,000 Dutch settlers when it disturbed the entire commercial policy of Great Britain in America and invited the English conquest. Expressed in figures of absolute volume, the manufactures of these infant settlements were not important, nor did their consumption cause more than a by-current in trade. But as the invasion of 8,000 Franks founded the Merovingian dynasty and gave one of its greatest nations to Europe, so did the petty industries of the frontier cabins lay the foundations of great manufactures, and their market sustain the first efforts of diversified production.

Our knowledge of the total population of the colonies at different periods is based on estimates rather than enumerations, but these are sufficiently accurate to measure markets. It is supposed that by 1640 there were 25,000 white settlers in the English colonies and that this number more than trebled during the next twenty years.[57] The settlement of New England was relatively more rapid than that of Virginia and Maryland, and it was more densely populated than the planting provinces. As early as the Revolution of 1688 the colonial population was thought to have increased to 200,000, of which New England and the Virginia-Maryland district each accounted for 75,000, the colonies between these two sections for something over 40,000, and the Carolinas, which included the present territory of Georgia, for less than 10,000.[58] The eighteenth century opened with something over 250,000 white settlers in English America, and this number appears to have doubled in about two decades. During this period the middle colonies, especially Pennsylvania, were growing rapidly in wealth and population and were receiving immigration from New England, which continued to be the most densely settled portion of America and partly for this reason showed the smallest increase in inhabitants. Again the population doubled in about twenty years, the million mark being reached between 1740 and 1745.[59] The colonists already formed a nation numerically important, whose clothing and conveniences well might employ in the age of handicrafts a small army of manufacturers; but the babe of 1745 had hardly attained his majority before these

[57] Dexter, F. W., quoted by Rossiter, *Century of Population Growth*, 8; *cf. History of British Dominions in North America*, I, 105.

[58] Randolph in a letter to the Committee of Trade and Plantations, Oct. 12, 1676, estimated the population of Massachusetts, New Hampshire, and Maine at 100,000; Prince Society, *Publications*, XXV, 235.

[59] New Jersey, *Archives*, VIII, 2, p. 132.

numbers again were doubled, and 2,000,000 people were demanding and assisting to sustain the multiplied wants of a community whose needs grew more complex as it expanded.[60] In 1775 Congress, in proportioning the Continental money among the States, estimated the total population at 2,243,000 whites and nearly half a million blacks. The first Federal census, in 1790, which gave the population of the Union as 3,929,214, confirmed the approximate accuracy of this estimate.

At the outbreak of the Revolution, therefore, the population of the colonies was more than twelve times as great as a century previously, and, for reasons that will presently be shown, their consumption of manufactures had risen faster than the number of inhabitants. Meanwhile every reason leads us to believe that a constantly smaller proportion of the settlers in the colonies north of Maryland were producing commodities for export. The decreased area of merchantable timber near the coast alone would suggest this. Wheat-raising was on the decline in New England before the close of the seventeenth century, and had "almost passed out of cultivation with the third generation of farmers."[61] This was due partly to the opening of new lands in the central colonies, which assumed in the eighteenth century the same agricultural relation to New England that the Mississippi Valley and the prairie States assumed to the Atlantic States after 1850. In Pennsylvania and New Jersey, though export farming extended, the growth of industries, relatively to their small beginnings, was even more rapid. These considerations, and others to be presented later, indicate that the growth of population was an index not only of the general demand for manufactures, which conceivably might have benefited British industries without affecting those in America, but also of a specific demand for home-made goods. It should be borne in mind, too, as affecting this increased demand, that the ratio in the growth of a market was a more important influence upon industrial development than the absolute growth, especially in a country so isolated as was America even up to the Revolution. To get a corresponding effect at the present time, the population of the United States would have to increase, by 1920, to nearly 170,000,000 people.

Leaving for a moment the question of markets, the discussion of population leads us to another relation between this topic and manufactures. Density of population is important as conditioning labor supply, and in that connection will be considered elsewhere; but the distribution of settlement as urban and rural, and as communal or dispersed, affected the growth of manufactures through a variety of influences, of which markets were only one. Cities set fashions and import new ideas; they support different trades and assemble various commodities which must be brought together in order that a new

[60] *Cf.* Johnson, *History of Domestic and Foreign Commerce of the United States*, I, 86; Pownall, *Translation*, 18–21.

[61] Weeden, *Economic and Social History of New England*, II, 506–507.

manufacture may arise. They favor the accumulation of capital and its coöperation in new enterprises; and, too, they are the warehouses and depots in which the products of industry most readily are exchanged. Without towns, as the plantation colonies realized when they tried to promote them by legislation, most manufactures languish or are not undertaken. Though all the colonial cities were seaports, established and supported by commerce, they were also the industrial centers of their respective provinces. Boston, Newport, Providence, New York, Philadelphia, Charleston, and, towards the close of the colonial period, Baltimore, presented something like urban conditions. In 1722 Boston was estimated to have 12,000 inhabitants, and twenty years later, 16,382.[62] It was thought that if persons absent on voyages and "several sons and apprentices designedly overlooked to ease the burden of Boston's provincial tax" had been included, the population would be in round numbers 18,000.[63] In 1744 a southern visitor to New England described Boston as the largest city in the colonies, "being about the same extent as the city of Glasgow, in Scotland, and having much the same number of inhabitants, which is between twenty and thirty thousand." He noted that from Salem Ferry to Ipswich "the houses are so thick planted that it looks like one continuous village."[64] A half century later a French traveler remarked that eastern Massachusetts was as well cultivated as France, and spoke of the road from Marlborough to Boston as a "continuous village."[65] In 1746, when there was an alarm of an attack by a French squadron, 6,400 militia quickly assembled under arms on Boston Common.[66] According to the Rhode Island census of 1774, Newport had 9,204 inhabitants and Providence 4,321.[67] The same year New York City and County were reported to have a population of 21,163, of whom 3,137 were black.[68] Philadelphia, the largest of the American cities, probably had about 30,000 inhabitants, while Baltimore was smaller than Newport; and Charleston, with a population fluctuating with the seasons, probably rivaled the Rhode Island metropolis. Yet these towns, on account of their wide commercial connections and of being the political and social centers of large territories, possessed a cosmopolitan spirit and culture beyond their size. Their influence upon manufactures was favorable for the reasons already mentioned, but at the same time they were centers of fashion that served to display and create a taste for the finer merchandise of Europe.

In the South the distribution of population over wide and thinly settled areas was one of the main causes checking the growth of

[62] Massachusetts Historical Society, *Collections*, Ser. III, vol. I, 152.
[63] *History of the British Dominions in North America*, I, 215.
[64] Hamilton, *Itinerarium*, 149, 177.
[65] La Rochefaucault, *Travels through North America*, I, 399.
[66] *History of the British Dominions in North America*, I, 215.
[67] Rhode Island, *Acts and Resolves*, 1774, 54.
[68] O'Callaghan, *Documents Relative to the Colonial History of New York*, VIII, 449.

manufactures. In Virginia Indian hostilities kept the white population concentrated for a period, but this influence was only temporary. Plantations soon became too dispersed to justify the erection of sawmills and gristmills, for whose products there were so few consumers within reaching distance; and for the same reason little inducement was offered mechanics to establish themselves in trade. The tobacco colonies formed a plantation community, bound together by social and political ties, but not economically interdependent. Such an organization of society discouraged "the growth of the coöperative spirit among the people in their economic affairs. It is this spirit upon which manufactures in their perfected form must rely in great measure for support."[69] In 1717 a pamphleteer described the Carolina planters as residing so far apart that, "living in a wilderness, incapable of mutual aid, the necessary artisans find no encouragement to dwell among them."[70] In a letter dated March 26, 1678, Lord Baltimore wrote that in Maryland there were no counties, parishes, or precincts, because of the sparse population. St. Mary's, the capital, was not a town, but some thirty houses, "after the fashion of the meanest farmhouses in England," scattered over a tract 5 miles along the shore by 1 mile inland.[71] Lord Bellomont, in a report to the Lords of Trade, written in 1699, stated: "Jamestown, which is the only place called a town in Virginia, has not above twenty houses, as I am told."[72] The market for manufactured goods in the southern colonies was lessened, relatively to the total population, by the low consumption of the slaves. In the middle of the eighteenth century Douglass described the charge of a negro as "a coarse woolen jacket and breeches, with one pair of shoes in winter," and his food as exclusively corn and salt.[73] An English army officer, who was a prisoner at Charlottesville, Virginia, after the defeat of Burgoyne, speaks of the slave clothing as "a shirt and trousers of coarse, thin, hard homespun stuff in the summer, with the addition of a very coarse woolen jacket and breeches in the winter."[74]

The rapid growth of colonial population during the last decades before the Revolution suggested some ambitious industrial enterprises, which it did not under existing competitive and transportation conditions provide a body of consumers large enough to support. As late as 1789, according to a Pennsylvania writer: "Most new works have been begun too large in this country. If we built a slitting mill it was made sufficient to slit as much iron in a week as we would sell in half a year. If we built a glass house, it was at the expense of thousands, and calculated to cover all that part of the country with

[69] Bruce, *Economic History of Virginia in the 17th Century*, II, 148, 397.
[70] Montgomery, "Discourse concerning South Carolina," in *Force, Tracts*, I, 1, p. 4.
[71] Maryland, *Archives, Proceedings of Council*, V, 265.
[72] Bellomont to the Board of Trade, Feb. 28, 1699, in O'Callaghan, *Documents Relative to the Colonial History of New York*, IV, 60; IV, 609.
[73] Douglass, *British Settlements in North America*, II, 373.
[74] Anburey, *Travels through the Interior Parts of America*, II, 333.

glass which was not covered by the houses."[75] Nevertheless this statement, which probably referred to Baron Stiegel's ill-advised enterprises in Pennsylvania, did not truly characterize most colonial undertakings. Local manufacturers well understood their inability to command their whole home market. The industrial development of Great Britain more than kept pace with the growth of her dominions. That country produced manufactures in such abundance that they sometimes were forced upon colonial markets in advance of a demand. Consequently an oversupply of manufactured goods, such as seldom or never occurred during the early years of settlement, is frequently recorded during the latter half of the eighteenth century. Intercolonial trade helped to regulate this competition by drawing off surplus commodities to places of better demand. A condition resulted from this that at first glance might not have been anticipated. The colonial ports that thus formed warehouses, whence foreign manufactures were distributed to remoter markets, themselves became centers of manufactures for those markets. In the wake of their other commerce followed the products of their domestic industries; and the geographical area which these industries supplied was widened by the very condition that limited their sales to local consumers.

EXPANSION OF THE HOME MARKET DUE TO DEVELOPMENT

Even in the longest-settled countries new natural resources are constantly discovered, internal improvements make it possible to assemble for manufacture materials that previously were too remote from each other to be used together, and from these conditions new industries arise and old ones are extended. The internal development of the colonies, especially in the eighteenth century, presented all these features. It is not improbable that, between 1750 and the adoption of the Constitution, despite the wars that intervene, as much land was brought under cultivation, with corresponding improvement of ways of communication, as during the entire previous period of settlement. This extension of agriculture carried with it mill-building and village handicrafts, which in turn made a demand on other local industries. The progress of settlement westward from the coast revealed new resources—mountain ores producing better grades of iron than had been made hitherto in the colonies, coal and lead in Virginia, and saltpeter from the Appalachian caves. The forest and the sea continued important fields for colonial enterprise, but were less dominant than formerly. The British policy of encouraging the production of raw materials in America itself reacted upon other industries. That these occupations supplanted home manufactures competing with those of England was true only with qualifications. Makers of pitch

[75] *American Museum*, VIII, 74.

and tar, hewers of timber, and smelters and forgemen, all depended in part upon the manufactures of the country in which they lived. Even the plantation colonies began to diversify their products, as settlement penetrated to the grain and flax lands of the interior and mill towns arose along the fall line of the southern rivers. In Virginia the culture of tobacco declined, or ceased to increase, about the middle of the eighteenth century, though the population was growing and new lands were brought under cultivation.[76] Petersburg and Richmond were becoming mill towns, and Baltimore was enriched by the growing trade of the interior uplands. Before the Revolution an English traveler noted that around Frederick and Hagerstown, although they did not stand upon navigable rivers, mills, forges, furnaces, and iron works were common; and that the Irish and German settlers through the back country of Maryland and Pennsylvania conducted every kind of manufacture and had extensive intercourse among themselves.[77] Produce from the hill country of North Carolina found its market in Virginia. At the time of the Revolution a French officer remarked as an effect of the war what was more largely due to the growth of population—the rapid extension of settlement inland and the establishment of many mechanics' shops to serve these interior communities.[78] Speaking of the Irish settlers 80 miles from the Catawba, the same writer said:

"It is easy to conceive that there is soon no deficiency of food [in these interior districts], but it is also necessary that their flocks and their fields should furnish them with clothing. They must manufacture their own wool and flax into cloth and linens, and must prepare hides to make shoes for themselves."[78]

The isolation that fostered these manufactures prevented their growth beyond a rudimentary stage until western migration carried the frontier to the tributaries of the Mississippi and Great Lakes; then the rivers that bore products to the interior themselves by an adverse current barred the way to competing manufactures. Settlements began to be formed on the western waters as early as 1748, but did not become numerous enough to support manufactures until the Revolution. In 1784 Pittsburg was making lumber, brick, and iron for the Ohio trade, and supplied the materials for building Louisville.[79] Before the adoption of the Constitution its pioneer newspaper advertised the shops of gold and silversmiths, lockmakers, other metal workers, cabinetmakers, and manufacturers of farming tools.[80] Throughout the colonies the growth of varied industries made a varied market, and in

[76] Jefferson, *Works*, VII, 407; *cf.* Mitchell, *Present State of Great Britain and North America*, 176, 177.
[77] Smythe, *Tour of the United States*, II, 258.
[78] Chastellux, *Travels in North America*, I, 54; *id.*, II, 39.
[79] Crèvecœur, *Lettres d'un Cultivateur Américain*, III, 396, 407; *cf.*, however, 399, Note 3, *f.*
[80] *Pittsburgh Gazette*, Nov. 18, 1786; Aug. 11, Dec. 1, 1787; Mar. 8, May 10, 1788.

such a market the local manufacturer had more advantage over his foreign competitor than where the same demands, repeated without change from season to season and year to year, caused a pulsation of trade reaching the remotest countries. The repair of machinery and implements, the supply of facilities for transportation, especially after boats and vehicles took the place of pack-trains, emergency demands for the tools of trade and the arms of protection, and growing interchange of local supplies as district became differentiated from district in response to varying resources and situations, all enlarged the call for local manufactures.

ARTICLES CONSUMED IN THE COLONIES

Colonial consumption embraced most of the articles of use or luxury found among the prosperous classes of England, and the variety of the demands that custom and caprice made upon industry was almost as great as at the present day. For purposes of rapid survey we may divide this market into four groups—clothing, furniture (using the word as was the custom of the time for all household articles), tools and implements, and luxuries. The last class included many objects serving purposes of display or refinement, seldom made in the colonies and largely imported even at present. They embraced, to quote from an advertisement of a Burlington merchant, in 1764: "Common pressed dolls, carts, chairs, horses for children; fiddlers for children, sorted toys, three and four joint hazel, dogwood and bamboo fishing rods, and three and four joint solid rods, kirby and common hooks, silk and hair lines, flies and gut, six and eight stave reels . . . straw, Japanned, and carved ivory tooth pick cases, playing cards, morocco pocket books . . . paste necklaces and earrings, silk and velvet needle cases, . . . backgammon tables . . . fine paper maché snuff boxes; engraved ditto."[81]

In colonial days clothing indicated rank and occupation more than at present, and in this respect the colonists may be divided into two classes—those who used imported garments and fabrics, and those who used homespun.[82] This distinction did not follow the same parallel in all the colonies, northern settlers of independent station often wearing homespun, while southern slaves were clad in rough cloth of English make. In general, however, rank and vocation set fashions and created habits that modified the influence of competition upon the respective consumption of domestic and imported textiles. A New England farmer might, by prejudice and unquestioning wont, use homespuns when foreign cloths were selling at the lowest prices, while a city gentleman, even in financial distress, would hardly wear the product

[81] Advertisement of Anne Hume, Burlington, New Jersey, in *Pennsylvania Journal*, Sept. 20, 1764, quoted in New Jersey, *Archives*, XXIV, 424.

[82] *Cf.* Bishop, *History of American Manufactures*, I, 331.

of family industry.[83] Competition existed rather between the finer colonial manufactures and those imported, and in respect to these two only, during most of this period, can we speak of a market involving exchange. That market was dominated by British goods, except when business depression or political agitation disturbed the normal course of trade. Nor was the boundary between homespun and commercial consumption inflexible. Merchant manufactures encroached upon the manufactures of the household from time to time, or permanently when new trade conditions were established.

The imported fabrics used in the colonies were, in order of importance, woolens, linens, and cottons; and of these, only the first were mainly of British manufacture. Among the woolen cloths that figured most prominently in the American market was broadcloth, which continued throughout this period the principal and the most expensive carded woolen fabric used in the colonies. This cloth was seldom manufactured in America for sale, though it was sometimes dyed and finished by colonial clothiers, especially when it became necessary to adapt an old stock to changing taste or fashion. These cloths were worn also white or undyed. Among coarser woolen cloths strouds, which found their way into the Indian trade, are frequently mentioned in commercial transactions. Kersey was a cheap cloth extensively imported in competition with homespun. Duffles and flannels were staple fabrics in the stocks of colonial merchants, the former often being used for blankets. Serges were the most common of the worsteds, and were worn by both men and women; they were manufactured to some extent in New England and Pennsylvania, in competition with imported goods. Druggets, linsey-woolseys, and other fabrics of mixed fiber, so extensively used in colonial days, were largely of home manufacture. We have few reliable statistics of the woolen imports of the colonies, even though we may assume that the contraband trade did not affect this class of merchandise so largely as it did manufactures from other countries than Great Britain; but sometimes French cloths were received irregularly.[84] During the year ending with Christmas, 1725, 806 bales and trusses of woolens were entered at the New York custom-house.[85] In 1721 the imports of British woolens into the North American colonies were valued by the Board of Trade at over $600,000, or more than the combined imports of all other textiles.[86] Without attempting a precise estimate, we may assume that the value of the English cloths used in the colonies continued to increase thereafter relatively to the value of other im-

[83] Acrelius, "History of New Sweden," in Pennsylvania Historical Society, *Memoirs*, XI, 157.

[84] *Cf.*, however, "An Abstract of the Total Values of all the Woolen Manufactures Annually exported from England to the Plantations," 1696–1714, in Public Record Office, *Colonial Office Papers*, 390, No. 12.

[85] O'Callaghan, *Documents Relative to the Colonial History of New York*, V, 774.

[86] "Report on the State of the Colonies," 1721, British Museum, *King's Manuscripts*, 205, in *British Transcripts*, Library of Congress, 27.

ported fabrics; and that not improbably the per capita consumption rose somewhat during the next fifty years.

Linens, using this term to include fabrics made of either flax or hemp, supplied many uses now served by cottons. As they were not manufactured extensively in England, those brought from abroad were at first mostly of Dutch and German manufacture and, after the bounty on Irish linen was established, from that island. In 1721 the value of foreign linens entered at colonial custom-houses or registered in Great Britain for export to the colonies, was nearly eight times the value of linen of British manufacture,[87] but this ratio must have changed rapidly during the succeeding decades. The hot summer climate of America and the mild winter temperatures of the southern colonies increased the consumption of these lighter fabrics. Acrelius wrote of Pennsylvania: "Handsome linen is the finest stuff sought by men, as the heat is great and of long continuance."[88] The summer clothing of the people of the North was usually a mixture of linen and cotton under the name of fustians and dimities. The former term was sometimes applied to a cloth containing wool. Unbleached imported linens usually went by the name of Hollands. Osnaburgs, or "osnabrigs," another local name from Europe, were used extensively, like denims at the present time, for the outer clothing of working-people. Other cheap and coarse linens were lockram and dowlas. "Negro cloth" and "Virginia cloth" were designations of coarse fabrics, probably containing hemp, flax or cotton, used for clothing slaves. Sheets and napkins generally were made of linen, but sometimes of cotton, which was higher priced than either linen or worsted. Fine muslins, cambrics, and lawns were imported, and though their consumption must have been relatively more limited than at present, they appeared in the stocks of most colonial merchants.

The use of Indian cottons was prohibited in England, for the protection of local manufacturers, but was permitted in America; and the importation of these goods, especially calicoes, was extensive. They were commonly used for women's dresses, and were so cheap and plentiful, compared with other similar fabrics, as to be considered a discouragement to home manufactures. In wealthier circles silks were worn by both sexes, silk stockings and waistcoats often appearing in men's wardrobes. Acrelius says that satin was used still more widely "all over the country." Damasks and expensive fancy cloths and plushes found a market in the cities and among the large planters.

Of hats and caps, the common consumption was supplied largely by American makers, but those imported continued to be preferred by the more exacting custom of the cities. Heavy boots and shoes found

[87] "Report on the State of the Colonies," 1721, British Museum, *King's Manuscripts*, 205, in *British Transcripts*, Library of Congress, 27.

[88] Acrelius, "History of New Sweden," in Pennsylvania Historical Society, *Memoirs*, XI, 157.

their way to the southern colonies from both New England and the mother country; the rural trade of the provinces north of Maryland was supplied chiefly by those of domestic manufacture. The value of leather goods imported was only one-tenth the value of the woolens, and included harness, saddlery, and minor articles, as well as fine and plantation shoes. In 1721 the recorded imports of the colonies, that might by a liberal definition be classed as clothing, were valued at somewhat under $1,500,000. Assuming the population at this time to have been 500,000, the foreign expenditures of the colonists under this head annually would have been about $3 per capita. In the eighteenth century textiles cost more than at present, and leather goods nearly as much, so that, even allowing for a relatively numerous child and servile population, and for the difference between English official and colonial retail valuations, it is evident that a large fraction of the home consumption was supplied from local sources.

The needs of the colonial household, though not as elaborate as those of the modern home, brought into request an even greater variety of articles. Domestic handicrafts called for their respective implements, the entire process of food preservation and preparation was conducted in the family, and other specialized services which are now the concern of outside agencies were supplied then by the industry of the fireside. In colonial homes of the better sort, as we know from examples that have come down to us, the furniture equaled in solidity, grace, and variety that with which we are familiar. The difference in the market of that period was its restriction to a smaller class, relatively to the whole population, than at the present time. The home of the merchant and planter alone afforded these conveniences; the mass of the laboring and farming people was far more scantily supplied. Writing of Massachusetts in 1763, Governor Bernard said: "Most of the furniture in the homes of the trading towns is of British manufacture: nails, glass, lead, locks, hinges, and many other materials for homes are wholly imported from Great Britain."[89] But even in the towns this was true only to a qualified extent of bulkier articles of furniture, such as tables, lounges, bedsteads, and chairs. Walnut tables, invoiced at $4 a foot, and chairs by the dozen, occur in the ladings of New England schooners trading with the southern colonies.[90] The ironware in the kitchen was largely of American make; and earthenware and pottery were not infrequently of colonial manufacture. Porcelain was replacing pewter, which had been made to some extent in New England, and cheaper white ware was gradually substituted for the wooden trenchers that had satisfied the taste and consulted the thrift of the earliest settlers. Not long before the Revolution Josiah Wedgwood, the father of the

[89] Governor Bernard to the Lords of Trade, 1763, British Museum, *King's Manuscripts*, 205 *ff.* 403–404, in *British Transcripts*, Library of Congress, 27.

[90] Timothy Orne, *Manuscript Mercantile Papers*, 1736 and 1748.

English porcelain industry, wrote that the British consumption of white stoneware was "very trifling in comparison with what is sent abroad; and the principal of these markets are the Continent and Islands of North America. To the Continent we send an amazing quantity of white stoneware and some of the finer kinds; but for the Islands we can not make anything too rich and costly."[91] The table furnishings of the better class of colonial homes may not have equaled in elegance those of the rich West Indian planters, but the merchants found custom, among other things, for glass tumblers, cruets, salts, mustard pots and cream pots, decanters, wine and jelly glasses, beer glasses and mugs, jars, and four vase syllabubs "in waves;" for porcelain dishes, plates, cups, coffee-pots, decorated cups, coffee and patty cans, fruit and salad dishes, and blue Nankeen tea-sets; and for silver salts, castors, cream jugs, table, soup, and tea spoons, and waiters.[92]

Agricultural implements were made at home, often with imported ironwork. The Virginia planters purchased cart-wheels from England, but made the remainder the vehicles in their own shops.[93] Edge tools, and in general all steel manufactures, were usually imported. But the extremely rapid growth of the demand for tools and implements used in clearing lands and settling and cultivating new country, especially during the decades immediately preceding the Revolution, caused American iron manufactures to be extended and improved. Though Great Britain shipped to the colonies ironwork as well as cordage and sailcloth for vessels, home industries also supplied a part of this demand.

The colonies were purchasers as well as sellers of raw materials. During the first half of 1770 Boston imported from Great Britain between 400 and 500 tons of hemp; also nearly 20 tons of brimstone, 13 tons of alum, and approximately an equal amount of copperas came from the same source to supply the powder-mills and dye-pots of the New Englanders and their colonial customers. Nearly 20 tons of gad steel, 180 boxes of tinned plates, 17 blocks of tin, and 2,224 bars, sheets or casks of lead were imported for local whitesmiths. To meet the needs of homespun industries, which were stimulated by political opposition to Great Britain, Boston, during these 6 months, took from the mother country abut 780 dozen wool cards and 34 dozen cotton cards.[94]

INTERCOLONIAL TRADE IN DOMESTIC MANUFACTURES

Sea-borne traffic has left so much more documentary evidence of its exchanges than has neighborhood trade in products of local industry that these records give us some of our best clues to the variety of commercial manufactures in the colonies. Coasting-vessels distributed

[91] Meteyard, *Life of Josiah Wedgwood*, I, 367; *cf. id.*, II, 3, 6, 475.
[92] New Jersey, *Archives*, XXIV, 424
[93] Bruce, *Economic History of Virginia in the 17th Century*, I, 476.
[94] Mein, *A State of Importations from Great Britain into the Port of Boston.*

British merchandise as well as colonial wares and produce, but in most cases it is possible to distinguish or surmise the origin of shipments. As early as 1716, according to an English economist of that century, "the domestic commerce which those northern provinces carried on with each other was now nearly equal to that with the parent country," and their trade to the West Indies and southern Europe was greater than both.[95] For many years, on account of its shallow harbors and difficult coast, the ocean commerce of North Carolina was conducted entirely in colonial vessels, mostly from New England.[96]

Intercolonial trade originated when the older settlements began to furnish provisions to their newer neighbors. Virginia corn fed the infant villages of Massachusetts.[97] Dutch traders at New Amsterdam soon established profitable connections with their Yankee rivals and with the tobacco planters of the South. As the export trade centralized at convenient ports, coasting-vessels became the collectors of commodities shipped abroad. We have seen that Connecticut and New Jersey were forced against their will to conduct their foreign commerce mostly through neighboring provinces. These conditions account in part for the heavy intercolonial trade in flour, provisions, and lumber. New Jersey shipped flour to New York, and New York shipped flour and bread to Boston, and to the Carolinas and Georgia.[98] Philadelphia sent large and frequent cargoes of flour to Boston, not only to supply the Massachusetts demand, but also to enable the New England merchants to provision their fishing and merchant fleet, to furnish the more northern colonies, and to complete their ladings for the West Indies and Europe.[99] Pennsylvania also shipped flour and bread southward, and Philadelphia and Baltimore vessels more than once relieved a threatened famine at New Orleans.[100] Illinois already shipped wheat and flour, in considerable quantities for the time, down the Mississippi to the Louisiana plantations.[101] Philadelphia starch was sent to New York in frequent consignments and found some demand in both Massachusetts and Carolina.[102]

Rum was considered almost as much a necessity as flour, and the New England distilleries supplied this commodity to all the other

[95] Chalmers, *American Colonies*, II, 8.

[96] O'Callaghan, *Documents Relative to the Colonial History of New York*, V, 609; Chalmers, *American Colonies*, II, 82; Governor Dobbs to the Lords of Trade, Feb. 23, 1763, British Museum, *King's Manuscripts*, 205, in *British Transcripts*, Library of Congress, 27; Byrd, "The Dividing Line," 32 in *Writings*.

[97] Winthrop, *History of New England*, I, 67; *cf.* Winsor, *Memorial History of Boston*, I, 276.

[98] Kalm, *Travels into North America*, I, 179, 199, 200, 201. New England, in turn, supplied the upper Hudson country with beef and pork; Smith, *Tour of Four Great Rivers*, 22; New Jersey, *Archives*, VI, 135.

[99] Weeden, *Economic and Social History of New England*, II, 615.

[100] Gayerre, *History of Louisiana*, III, 31.

[101] Chastellux, *Travels in North America*, II, 102, 103; Gayerre, *History of Louisiana*, II, 35.

[102] *E. g.*, *Custom House Papers*, I, 26; 46, 47; Austin and Laurens, *Manuscript Account Book*, 344.

colonies. New York exchanged flour for rum in New England and distributed it southward and to the Indian trade through Albany. New York beer was advertised in Boston, and Pennsylvania beer sold throughout the southern colonies and Canada.[103] Before 1650 Massachusetts cider was shipped to Maryland.[104] The Pennsylvania settlers awaited provision ships from Rhode Island with butter, cheese, and candles,[105] and Benedict Arnold in his youthful days traded Connecticut cheese at a high profit in Canada.[106] Sugar formed part of many a coasting cargo, and New York refiners traded actively in this commodity with their neighbors from Maryland southward.[107] Soap constituted part of a Massachusetts lading to Virginia in 1697, and seventy years later some 21,000 pounds of this article are recorded in coastwise shipments.[108]

We have seen that New York protected its coopers from the competition of casks imported from the neighboring provinces. In 1748 the traveler Kalm mentioned among the New Jersey exports to that city "wooden vessels and all sorts of carpenter's work."[109] Coasting schooners from Massachusetts and other parts of New England traded wooden ware to Maryland, and farther south. Though this trade was less active at a later period than towards the close of the seventeenth century, consignments of buckets by the dozen occur frequently in invoices.[110] When the roads were so far improved as to permit the use of pleasure carriages and other light vehicles, the planting colonies were partly supplied with these by Philadelphia makers.[111]

During the later colonial period iron and ironware were among the most important coastwise commodities, and even at a very early date the New Englanders appear to have traded with the tidewater plantations for old iron and pewter. New York, New Jersey, Pennsylvania, and Maryland shipped pig-iron to Massachusetts, where it was cast into pots and kettles, refined into bars, and manufactured into nails and implements, part of which were reshipped to the central and southern colonies.[112] New England manufacturers were also insistent

[103] Bishop, *History of American Manufactures*, I, 150; *Boston Newsletter*, Feb. 4, 1731; Austin and Laurens, *Manuscript Account Book*, 401, 408, Feb. 21, 1757; *Custom House Papers*, I, 54, June 19, 1761.

[104] Essex Institute, *Historical Collections*, I, 172, 173.

[105] Hannah Penn to James Logan, *Penn-Logan Correspondence*, in Pennsylvania Historical Society, *Memoirs*, IX, 13–14.

[106] Chastellux, *Travels in North America*, I, 362, translator's note.

[107] Van Cortlandt, John, and Son, *Manuscript Sugar House Letter Book*, Feb. 7, 15, 1764, *et passim*.

[108] Felt, *Annals of Salem*, II, 246; "Account of Shipping, Imports, and Exports, 1768–1769," in British Museum, *Additional Manuscripts*, 15485.

[109] Kalm, *Travels into North America*, I, 179.

[110] Timothy Orne, *Manuscript Mercantile Papers*, Nov. 14, 1749; Maryland, *Archives, Proceedings of Assembly*, XIX, 339, 381.

[111] B. Laurens, *Manuscript Letter Book*, Sept. 9, 1771, 15; Woolsey and Salmon, *Manuscript Letter Book*, Dec. 12, 1776.

[112] House of Commons, *Journal*, Mar. 21, 1737, XXXIII, 112, 113, 144. Lynn shipped iron ware to the "Dutch and Delaware," and to the Barbados, in 1651–1652. Corning, *The First Iron*

buyers of nail rods from Philadelphia forgemen.[113] Pennsylvania likewise exported manufactured iron. In 1752 more than 4,600 tons of bar and rod iron were shipped from Philadelphia, mostly to other colonies and the West Indies, the greater part of which must have been manufactured in America, as the imports of Pennsylvania and the neighboring provinces never exceeded a few hundred tons per annum.[114] In the eighteenth century Pennsylvania stoves were advertised in Boston; and by a curious back-current of trade, hoes manufactured in Carolina were sold in the city of New York.[115] Before the adoption of the Constitution tools and agricultural implements made in Philadelphia were sold extensively in other colonies, and at an even earlier date that city made sugar machinery for West Indian plantations.[116]

Under Dutch rule bricks were sent from Albany to the Delaware, and in Clinton's administration New York imported them from both New England and the colonies towards the south.[117] After the fire in Charleston, South Carolina, in 1740, the assembly fixed by law the price of New England brick.[118] In the seventeenth century New Jersey white ware is said to have been sold throughout the colonies;[119] and later that province and Connecticut imported stoneware from Pennsylvania.[120] Georgia, soon after its settlement, supplied pottery to South Carolina, and Charleston merchants at a later date imported colored tiles from Pennsylvania makers.[121]

The trade in colonial leather and leather goods also extended along the entire coast. The exchange of leather was reciprocal, Pennsylvania supplying the Carolinas and in turn receiving from them. Both North and South Carolina leather found a market in New England, and the New Jersey tanneries sent their product to New York.[122] Manufactures of leather were chiefly in the North, which also supplied Canada with

---

Works in America, 7. Hollow ware from Pennsylvania pigs was cast in Massachusetts and shipped back to Philadelphia; *Mercantile Letters*, Library of Congress, Sept. 23, 1765; Babson, *Gloucester*, 384. Bar iron was shipped from Philadelphia to New England and scythes returned; Smith & Sons, *Manuscript Letter Book*, to John Soley, June 25, 1770; *cf.* advertisement, *New York Gazette and Weekly Postboy*, Aug. 18, 1766.

[113] Smith and Sons, *Manuscript Letter Book*, May 9–July 17, 1770.

[114] Pennsylvania Historical Society, *Memoirs*, XI, 142.

[115] *Boston Newsletter*, Feb. 7, Mar. 7, 1745.

[116] Laurens, B., *Manuscript Account Book*, Aug. 26, 1767, 1; Austin, Laurens, and Appleby, *Manuscript Accounts*, 106–107; advertisement, *Pennsylvania Journal*, May 8, 1776; New Jersey, *Archives*, Ser. 2, vol. I, 98.

[117] Bishop, *History of American Manufactures*, I, 224; O'Callaghan, *Documents Relative to the Colonial History of New York*, VI, 510, 511.

[118] South Carolina, *Session Laws*, 1740–1742, 53.

[119] Barber, *Pottery and Porcelain of the United States*, 54, 55.

[120] Advertisement, *New Jersey Gazette*, Dec. 23, 1778, in New Jersey, *Archives*, Ser. 2, vol. II, 604; also *Pennsylvania Gazette*, June 28, 1764, and New Jersey, *Archives*, XXIV, 385; Barber, *Pottery and Porcelain of the United States*, 102, quoting advertisemet in *Holt's New York Journal*, 1774–1775.

[121] "Description of Georgia," in *Force, Tracts*, II, 12, p. 4; Austin and Laurens, *Manuscript Account Book*, letters to William Fisher, June 15, Sept. 9, 1756, 307.

[122] *E. g.*, advertisement, *Boston Newsletter*, Dec. 4, 1760; Weeden, *Economic and Social History of New England*, I, 308; II, 591, quoting advertisement, *Boston Gazette*, Apr. 13, 1724; *id.*, II, 627; Bishop, *History of American Manufactures*, I, 461; Austin and Laurens, *Manuscript Account Book*, Feb. 24, 1757, 407; Massachusetts Historical Society, *Collections*, Ser. VII, vol. IX, 114.

this product.[123] Massachusetts sent saddlery to the South and from the middle of the seventeenth century shipped shoes to the other provinces. There are records of consignments of Massachusetts shoes to New York and Philadelphia, and of exports from New Haven to the neighboring colonies.[124] In 1769 a "Jersey shoe warehouse" at Albany traded largely in Newark manufactures.[125] Meantime Pennsylvania itself supplied part of the southern trade, but largely as a distributor.[126] In 1768 the recorded exports of Massachusetts were nearly 9,000 pairs, while Pennsylvania imported 7,918 pairs of American manufacture. The American shoes entered at the ports of all the Continental colonies, including Nova Scotia, were nearly 13,000 pairs.[127]

Philadelphia was the colonial paper market, and, in 1768, exported 1877 reams to the other colonies.[128] Philadelphia glazed paper was advertised for sale in Boston.[129] Cordage was manufactured for the intercolonial trade, principally in Massachusetts and Pennsylvania. That the textile industries were active is indicated by their product beginning to appear in commercial statistics. During 1768 Pennsylvania imported over 35,000 pounds of dressed flax and had no recorded exports of this commodity. In 1768 Connecticut exported 1,530 yards of tow cloth, and twenty years later it was stated that during one year three Philadelphia houses had sold 50,000 yards of New England linens.[130] That city imported, not in default of local manufactures, but because it was a distributing point for yarn, linen, and hose to the back country and the southern plantations. That the textile trade was not unimportant is indicated by the fact that as early as 1754 a New Brunswick boat, which foundered on its way to New York, was carrying "between a thousand and twelve hundred pounds worth of linen, manufactured in the Jersies, and bringing hither for sale."[131]

In spite of British prohibitions various manufactures of woolen found their way from colony to colony. New York, which at one time had imposed a tariff upon the woolens of the neighboring provinces, continued to receive them in small quantities in the eighteenth century. In 1756 an assorted cargo from Boston to Albany contained, among other woolens, 200 homespun jackets. It is said of Benedict Arnold, before the Revolution, that in winter he "went amongst the Dutch

[123] Governor Carlton of Quebec to the Earl of Hillsborough, Aug. 31, 1768, British Museum, *King's Manuscript*, 205, in *British Transcripts*, Library of Congress, 23; Weeden, *Economic and Social History of New England*, I, 376; Massachusetts, *Archives*, LXIII, 88.

[124] Weeden, *Economic and Social History of New England*, I, 184; Timothy Orne, *Manuscript Mercantile Papers*, 1736–1749; Bentley, *Diary*, IV, 824; Letter of Dr. Cooper to Benjamin Franklin, Aug. 3, 1769, in British Museum, *King's Manuscripts*, 203.

[125] Smith, *Tour of Four Great Rivers*, 18.

[126] Davey and Carson, *Manuscript Letter Book*, letter of July 6, 1747, to James Pritchard.

[127] "Account of Shipping, Imports, and Exports, 1768–1769," in British Museum, *Additional Manuscripts*, 15485.

[128] "Account of Shipping, Imports, and Exports, 1768–1769," in British Museum, *Additional Manuscripts*, 15485.

[129] Advertisement, *Boston Newsletter*, Jan. 23, 1746.

[130] *Boston Centinel*, Oct. 29, 1788; Bagnall, *Textile Industries*, 113.

[131] *New York Gazette and Weekly Postboy*, June 10, 1754, in New Jersey, *Archives*, XIX, 373.

towards the head of Hudson's River, and into Canada, with various sorts of woolen goods, such as stockings, caps, mittens, etc.," which his father-in-law obtained from the Connecticut farmers in exchange for West India merchandise.[132] This peddling trade through the interior was not less active, though necessarily on a smaller scale, than the traffic along the coast. It expanded into almost a caravan commerce from Philadelphia through the highland settlements southward, and carried with it Germantown worsteds and stockings as well as tow cloth and linen. Hats, both of fur and wool, were shipped from the northern to the southern colonies in quantities to supply most of the country trade.[133] New England, New York, and Pennsylvania were seats of this manufacture, and their exchanges brought back wool and fur from the South to supplement local sources.[134]

In many colonial towns, weekly or biweekly markets afforded an opportunity for the sale or barter of neighborhood manufactures, and the fairs held at different seasons in the more important places assisted the exchange of products of different colonies. Such gatherings fell somewhat into disrepute in the eighteenth century on account of the drinking and disorder that attended them, but they were revived before the Revolution. In 1764 an advertisement of the Burlington fair announced that stalls had been assigned gratis "for all kinds of linen and woolen manufactures of this and neighboring colonies."[135]

Though the record of intercolonial trade is so defective, and the statistics and examples here given do not represent the full volume and variety of this traffic, it is evident that before the Revolution the domestic market for home manufactures was practically as broad as the colonies themselves. A demand area of such territorial extent invited increasing diversification of industry. The differentiation of the planting from the export farming colonies, and of the export farming from the fishing and lumbering colonies, dated from the beginning of settlement and formed the basis for an intercolonial division of labor applying not only to raw materials but also to finished products; for the commerce founded upon difference of primary productions opened a market for exchanges of manufactures that might not have been possible without this support. And it was the spirit of trade, developed by necessity in the Yankee settlers and their neighbors, that made them ready almost prematurely to venture their homespun products in distant quarters and thus to supplement the poverty of their resources by the activity of their industries.

[132] Chastellux, *Travels in North America*, I, 362, translator's note.

[133] Weeden, *Economic and Social History of New England*, II, 590; Chalmers, *American Colonies*, II, 119; *History of the British Dominions in North America*, I, 219; New Jersey, *Archives*, V, 307; *Charleston Gazette*, Nov. 3, 1785.

[134] *Cf.* Macpherson, *Annals of Commerce*, III, 163.

[135] *Pennsylvania Gazette*, Oct. 18, 1764, quoted in New Jersey, *Archives*, XXIV, 439; *cf.* Bishop *History of American Manufactures*, I, 315.

RELATIVE CONSUMPTION OF FOREIGN AND DOMESTIC MANUFACTURES

We here may be allowed to ask, though we can give but an imperfect answer to the queries, whether the consumption of commercial manufactures varied in a constant ratio to the population throughout the colonial period, or rose and fell with trade prosperity and changes in the standard of living; and whether the respective proportions of imported and home manufactures used in America remained the same or likewise fluctuated with the varying economic condition of the people. Positive testimony exists as to temporary changes in both these respects during financial or political crises, but it is more difficult to arrive at conclusions as to permanent tendencies.

Homespun industries were not prosecuted with equal activity at all periods in the South, and possibly not in the northern colonies. The first generation of settlers, before there was a native American population, brought with them the usages of the old country, and only with time adapted themselves to pioneer conditions. They maintained in their homes, possibly to a greater extent than the next generation, the industries of the mother country. This was notably true of Maryland and Virginia, where some of the first plantations seem to have been nearly self-dependent for clothing as well as provisions; and we have the evidence of legislation that the gradual neglect of homespun arts was later a matter of concern both in those colonies and in New England. But though household spinning and weaving, brought over by the English settlers as part of their ancestral regimen, may have declined, they never ceased entirely. In 1657 three ships brought all the foreign goods used in New England. A historian suggests that, "three or four ships could hardly have balanced the wants of so many people if their consumption had not been largely supplied at home."[136] And even though, after the first generation of settlers passed away, home industries may not have kept pace with the population, English skill and traditions constantly were renewed in America by immigrants, and habit reinforced necessity in maintaining household manufactures.

When the first colonies were founded, all their supplies, including provisions, were brought from Great Britain, and those later established received food from their older neighbors. As late as 1655 the General Court of Massachusetts thought it necessary to forbid bringing into the colony from abroad malt, meal, flour, wheat, barley, biscuit, beer, and salted beef; but soon after that date flour, biscuit, beer, and beef were exported. Therefore, as the first pioneers became settled in their new homes they consumed relatively fewer imported goods. Consequently, in very new colonies and in those rapidly extending

[136] Weeden, *Economic and Social History of New England*, I, 160.

their area of settlement, the ratio of imports to population tended to be highest, and possibly this ratio rose somewhat during any period of expansion and declined during periods of stationary development.

The first immigrants to America, accustomed to the comforts and refinements of European life, probably maintained, so far as was in their power, a higher standard of living than their children, who grew up amidst the hardships and privations of the frontier. In the New England colonies, towards the close of the seventeenth century, there seems to have been some retrogression in education and culture, similar to that which occurred later among the settlers in the southern mountains, and this was possibly accompanied by less demand for imported manufactures; but, on the other hand, the differentiation of social classes, the increasing size and wealth of the towns, and the rise of an export trade, soon counteracted what must have been, as applied to the entire population, but a temporary tendency. There is abundant testimony that the standard of living in the colonies was rising rapidly throughout the eighteenth century and that widely diffused comfort, and even wealth, encouraged the demand for foreign luxuries.

The question arises whether the growing demand for imported goods was at the expense of home manufactures. This was asserted, during the controversies preceding the Revolution, by those who sought to alleviate the fear of British exporters that the Americans were trying to achieve industrial independence, and by those who extolled the value of the colonial market for political reasons.[137] There was an early view that English exports to America were not keeping pace with the growth of population. In 1715, in a discourse upon the trade of New England, a colonial merchant wrote: "The exportation from England has increased actually, but not relatively, for the simple reason that three men require more clothing than two."[138] Over half a century later, Burke, in his argument in behalf of the colonies, showed that in 1772 Pennsylvania imported nearly fifty times the value of British manufactures that it imported in 1704;[139] and a contemporary pamphleteer published custom-house statistics indicating that the imports of the same colony from Great Britain rose from £16,000 sterling, in 1723, to more than £268,000 in 1757. In those twenty-four years the imports had grown in the proportion of 17 to 1, though it was thought that the population in the same period had not more than quadrupled.[140] The reason assigned was that "the people having by their industry mended their circumstances, are enabled to indulge themselves in finer cloaths, better furniture, and more general use of all our manufactures than before."

[137] *Boston Newsletter*, Aug. 7, 1760.

[138] Banister, *Discourse on the Trade of New England*, 175; quoted by Lord, *Industrial Experiments in the British Colonies*, 133–134.

[139] Burke, "Speech on Conciliation," in *Works*, II, 115.

[140] Franklin, *Works*, IV, 68, Note 2.

Benjamin Franklin testified before Parliament that Pennsylvania's imports from Great Britain were growing faster than the population, "as the consumption is not merely in proportion to their numbers, but grows with the growing abilities of the same numbers to pay for them."[141] However, none of these authorities indicated the final destination of the goods received at Philadelphia or pointed out that the rising imports of that city were caused in no small part by its growing importance as a distributing center to the other provinces, and they failed to mention that at the later date closer supervision of colonial trade had reduced greatly the illegal traffic formerly so active.

The statistics of colonial commerce, which should afford a basis for generalizations as to the consumption of foreign goods at different periods, and therefore as to the volume of domestic manufactures, are unsatisfactory for three reasons: the accessible figures are fragmentary; we have the statement of one of the most intelligent contemporary students of colonial commerce that the Board of Trade systematically overvalued exports to America and undervalued imports;[142] and these records leave out of account the illicit and indirect trade, which at times may have equaled or exceeded commerce through regular channels. As colonial purchases abroad sometimes fluctuated over 100 per cent on successive seasons, because of the interruptions of war, poor crops, or low prices for American produce, the imports for single years were often not representative. Yet with all these allowances the following figures have a value for comparison: In 1698, when the population of the colonies was somewhat under 272,000, the original official value of the goods they imported from Great Britain was $2,034,000, or about $7.50 per capita.[143] From 1714 to 1717, when the population was nearly half a million, the original value of imports from the mother country was $1,814,000, and the true value probably about $2,220,000, and therefore but $4.20 per inhabitant.[144] During the first three years of the reign of George II, at whose accession, in 1727, the colonial population was estimated at 580,000, the imports annually averaged $2,320,000, or about $4 for each person.[145] This sum fell to about $3 for the five years ending with 1748, when the population of the colonies was approaching 1,000,000 and their annual imports

[141] "The Examination of Doctor Benjamin Franklin, Relative to the Repeal of the American Stamp Acts in 1766," in Almon, *Tracts*, III, 3, p. 10.

[142] Chalmers, *American Colonies*, II, 40–41.

[143] "Abstract of Importations and Exportations, 1697–1698," British Museum, *Stowe Manuscripts*, 318, *in British Transcripts*, Library of Congress. Chalmers, however, (*American Colonies*, I, 319), makes this $1,444,000, or $5.30 per capita; *cf.* also Secretary Stanhope to Lords of Trade, in New Jersey, *Archives*, IV, 348, which accords closely with the *Stowe Manuscripts* figures. The pound sterling was then worth $4.44.

[144] "Report on the State of the Colonies," 1721, British Museum, *King's Manuscripts*, 205, in *British Transcripts*, Library of Congress, 27 (for lower), and O'Callaghan, *Documents Relative to the Colonial History of New York*, V, 617 (for higher value); *cf.* also Chalmers, *American Colonies*, II, 39, 40, 41.

[145] Chalmers, *American Colonies*, II, 116.

averaged $3,095,000.[146] At the close of the colonial period, between 1768 and 1774, when the inhabitants had increased to nearly 2,750,000, they annually bought from British merchants goods to the value of $12,130,000, or about $4.40 per capita.[147] Throughout the eighteenth century, therefore, the expenditures of the colonists for merchandise from the mother country did not exceed, in the retail market, $10 yearly;[148] and they did not, from period to period, vary sufficiently to require a special explanation. Illegal trading, and indirect receipts through the West Indies and the Spanish Islands, must have increased these figures, but we are unable to say to what extent at different times. Meanwhile, on account of the greater general well-being of the colonists and the growing wealth of the coast cities, the average consumption of manufactures by each inhabitant probably was increasing. The growing slave population of the South may have lowered the per capita consumption of those provinces, but that consumption seems rather to have been governed by their ability to pay for foreign manufactures with home commodities. The New England and central colonies appear regularly to have taken fewer foreign manufactures per capita than the plantation settlements, even after they became importers for the latter. With the industrial progress of England, the proportion of British manufactures among the goods shipped to America from that country continued to increase, rising from 66 per cent in 1698 to 76 per cent in 1721, and 81 per cent during the six years ending with 1774. This was due largely to the substitution at the later period of Irish for Dutch and German linen.

In their commercial relations with Great Britain the colonies suffered from an unfavorable balance of trade; often they were unable to find commodities to exchange for necessary manufactures, and usually they were compelled to supplement their shipments to the mother country by the surplus from their West Indian business and their profits as ocean carriers. During the eleven years ending with 1773 the estimated value of goods shipped from Great Britain to the Continental colonies was in the neighborhood of $115,000,000, and the returns made by the colonies, in their own produce and that of other parts of America, were about $60,000,000, leaving a balance of $55,000,000 to be made up from outside sources.[149] This debt fell almost entirely upon the colonies north of Maryland, as that province and its

[146] Dickenson, John, "Regulations Respecting the British Colonies," in Almon, *Tracts*, I, 4, p. 21. Comptroller Weare estimated these imports at about $4.44 per capita for the white population alone; Massachusetts Historical Society, *Collections*, Ser. I, vol. I, 79.

[147] Great Britain, *Report of the Lords of the Committee of Privy Council on the Commerce and Navigation between His Majesty's Dominions and the Territories of the United States of America*, Jan. 28, 1791, p. 21; also reprinted by U. S. Department of State, p. 10. Tables of Colonial exports in 1770 and of Colonial imports and exports from 1697 to 1796 are given in Johnson's *History of the Domestic and Foreign Commerce of the United States* I, 118–121.

[148] *Cf. American Husbandry*, quoted in Callender, *Economic History of the United States*, 40–41.

[149] La Rochefaucault, *Travels through North America*, II, 595.

southern neighbors shipped to Great Britain tobacco, rice, and naval stores equaling and sometimes exceeding in value their English purchases. The manufactures as well as the trade of the northern colonies were stimulated by the necessity of supplying this deficit; and the colonial market for foreign goods was limited, and that for home manufactures was extended, by the need of keeping liabilities to the mother country within the bounds of solvency.

The information as to the industrial growth of the colonies recorded in commerce has more descriptive than quantitative value, but in the latter direction it allows us to form two conclusions: that during the last century of colonial history a growing market abroad caused primary manufactures in America to expand and multiply; and foreign competition, though it continued to limit, did not seriously encroach upon existing manufactures for home consumption. The market for the productions of local industry was protected by conditions that remained nearly uniform, and though its influence may not have increased the volume of home manufactures much faster than the growth of population, it tended to diversify and specialize them and thus to prepare the way for their more rapid extension under the Republic.

CHAPTER VI

CURRENCY AND PRICES

Prices and manufactures, 123. Scarce and unstable currency, 123. Business crises, 129. Influence of war upon colonial manufactures, 132. Prices of primary manufactures in the colonies, 135. Prices of textiles and clothing, 140.

PRICES AND MANUFACTURES

One of the most marked characteristics of colonial markets was their instability. This was due partly to their remoteness from sources of demand and supply and partly to their use of a fluctuating currency. Such conditions were less unfavorable to homespun industries than to commercial manufactures. The price combination was most favorable to household industry when lumber, naval stores, flour, and provisions were low and imported merchandise was high; while a reversal of these conditions caused primary manufactures to flourish but fireside industries to decline. These reciprocal price relations were usual, because they bore a causal relation to each other; but sometimes an overstock of European wares accompanied a torpid demand for colonial productions, thus lowering the entire price-level, and occasionally a period of general trade activity caused a simultaneous rise of prices for both imported and domestic manufactures and commodities. The effect of these latter conjunctions upon different branches of colonial industry is more difficult to estimate from contemporary evidence.

Prices were the avenue through which political events bore most directly upon manufacturing industries. Wars interrupted supplies, and treaties closed or opened foreign markets, while regulations imposed by a government not responsible to the colonists themselves disturbed the natural channels of commerce. Because such events could not be controlled, and to a large extent could not be anticipated in America, they reacted more violently upon the market than they would have done had the country been independent. Prosperity seems to have stood on a more precarious basis than at present, and exchange values rose and fell with a suddenness that would have wrecked a more complex system of industry and finance. The economic stability of society rested upon the self-dependence of the family.

SCARCE AND UNSTABLE CURRENCY

The fluctuations of colonial currency arose from attempts to remedy its scarcity; and the scarcity resulted not from lack of wealth, but from the tendency of capital in a new country to assume fixed forms. Therefore, the want of money, with all its direct and indirect effects upon the growth of manufactures in the colonies, was but one phase

of the influence of undeveloped natural resources in retarding secondary industries.

No student of the period is apt to overlook the scarcity of currency in colonial times, for it formed the burden of complaint of every contemporary writer, legislator, or administrator who touched upon an economic question. Three main causes for this condition were: an unfavorable balance of trade with Great Britain, which drew off the coin of the colonies to make good a debt which they could not pay with commodities; a lack of credit institutions, which caused payments in coin or in kind to form a much larger proportion of business transactions than to-day; and the unwise measures taken by the colonies to remedy these difficulties, which resulted in an inflated paper currency (an American invention) and drove good money out of their confines. The essence of colonial currency policy was to keep coin within the province by depreciating the money of account, it being thought that the dollar would go where it would buy the greatest number of shillings. Competition among the colonies for coin and the introduction of paper credit money hastened the decline of the colonial shilling in exchange.

This lack of currency and of a sound system of finance was more influential than lack of capital in checking the growth of colonial manufactures. For while many of these manufactures could be conducted with little capital, on account of the primitive technical development of all industries at this period, they could not expand beyond a very limited sphere without an adequate instrument of exchange. The direct importation of money was made commercially impossible, at least in the northern colonies, by unfavorable trade balances; though had there been more local manufactures in Virginia and Maryland, the large tobacco credits of those colonies in England might have induced a flow of sterling to America. But the habits of the colonists, and the need of capital for opening new land under the wasteful system of culture then pursued, caused the southern planters to take up their credits either in manufactured goods from Great Britain or in provisions from their northern neighbors.[1]

In default of coin various substitutes for money were used, and an extensive system of barter sprang up. So long as it was redeemable in beaver from the Indians, or until the beginning of the eighteenth century, bead money, or wampum, passed current in New England and the central colonies. Its ratio to silver was regulated by several colonial acts, and it was "an universal currency exchangeable for merchandise, for labor and for taxes."[2] As the outposts of the fur trade withdrew westward and the economic life of the colonies became more complex, wampum depreciated and was replaced in part by silver from

[1] *Cf.* Accomack County Petition of Grievances, Oct. 6, 1697, in Virginia, *State Papers*, I, 54.
[2] Weeden, *Economic and Social History of New England*, I, 41.

the West Indies. Commerce with the latter islands was what early writers called the specie trade of the colonies. The silver mines of Mexico and Peru supplied ample currency to the inhabitants of the Spanish tropical possessions in America, which they exchanged for lumber, provisions, horses, and the minor manufactures of their English neighbors to the north, although among themselves they still maintained, to a considerable extent, a system of barter.[3] When the population of the colonies grew larger and their balance of trade with England more unfavorable, this source of currency became inadequate to supply the demands of domestic exchange and the constant drain of precious metals to the mother country. Wars with the Indians and French caused larger public expenditures, which were met by what were practically government loans, issued in the form of paper currency secured only by the credit of the particular colony making the emission. The denomination of the earlier bills was stated only in pounds and shillings, which were themselves fluctuating units of value in the colonies, bearing no fixed relation to their sterling counterparts. Later bills were made payable in stipulated weights of silver. All this paper, especially the earlier issues, rapidly depreciated, and rendered the currency situation more acute by driving out of circulation, in many colonies, the little silver that remained. At no time, therefore, was domestic exchange unhampered by the want of some medium for expressing and transferring values.

The depreciation of the coin shilling in America, as compared with the sterling shilling, began almost immediately after settlement and was due to a variety of causes, both natural and artificial, among which must be reckoned the variation in the price of bullion in the English market. As early as 1642 the colonial shilling was 20 cents of the Spanish dollar, which, though nominally nearly 8 grains heavier than the present United States dollar, was as it appeared in circulation considerably less in weight.[4] When the pine tree shillings were coined in Massachusetts they were made, partly to retain them in the country, of about the value of 18 cents. In 1709 Parliament tried to standardize the colonial shilling, which was of different values in different provinces, at $16\frac{1}{2}$ cents, but without effect.[5] The depreciation, assisted by the almost universal practice of clipping coins, continued until after the Revolution, when Congress made the shilling of the Republic equal to the Spanish real, or $12\frac{1}{2}$ cents, thus recognizing a common trade value of that monetary unit.[6] Meanwhile, in some of the New England colonies, the paper shilling, starting at an exchange value of 14 to 16

[3] Weeden, *Economic and Social History of New England*, I, 314, 324, quoting Blome, *Description of Jamaica*.

[4] Appendix I.

[5] 6 Anne, Chap. xxx, 324. See an account of this legislation in John Ashley's *Memoirs and Considerations concerning the Trade and the Revenues of the British Colonies in America*, 50–55; and in Public Record Office, *Colonial Office Papers*, class 324, No. 12, *ff.* 208–210, 217–226, in *British Transcripts*, Library of Congress.

[6] *E. g.*, in New York and North Carolina.

cents as compared with silver, sank to 2 or 3 cents and in Rhode Island to less than 1 cent. In the Carolinas the paper shilling fell below 3 cents.[7] The middle colonies maintained their credit better and Pennsylvania, until the French and Indian war, issued notes for circulation only against adequate security.

These monetary conditions, in their reaction upon manufactures, may be considered under three aspects—barter, depreciation, and paper inflation. Barter gave some manufactures and raw materials directly assisting manufactures a new use by making them instruments of exchange. Wool, flax, hemp, lumber, tar, potash, flour, and packed provisions were compact embodiments of value received as taxes and made by statute legal tender for debts. In 1641 the assembly of Virginia passed an act that no debts contracted in the colony for payment in sterling should be pleadable at law unless it were for the purchase of horses, mares, and sheep.[8] Tobacco soon took the place of coin in that colony, as beaver-skins and farm produce did farther north. No commodity had a stable value, and consequently prices were so graded as to allow a large margin for fluctuation. In New England, where the laws fixed a nominal current value for most commodities used in barter, the price in goods was usually from one-fourth to one-third higher than the price in money. The prices of the different articles used in barter were subject not only to general rises and declines but they were constantly fluctuating with reference to each other. In 1674 Rhode Island attempted to make wool, which was probably the most stable commodity trafficked among the inhabitants, a standard of exchange at 12 pence a pound, but without permanent results.[9]

The disadvantages of this system to the mechanic and the manufacturer are obvious. The former could not accumulate and the compensation for his services was subject to all the vicissitudes of a complex commercial transaction. An artisan who was to receive his pay in pork and corn often found it more profitable to raise this produce directly on his own land and to withdraw entirely from skilled pursuits. To capitalize a large undertaking, like building a ship, required a complex combination of mercantile credits and the workmen were paid in produce or store-orders. The hardships that this enforced upon the latter are recited in one of their petitions and probably tended to drive them into other vocations.[10] In 1760 the Ringwood Iron Works, of New Jersey, thought it expedient, in advertising for workmen, to say: "They will be paid in ready cash for their labor."[11] Custom gristmills, sawmills, fulling mills, and distilleries received toll in kind for their services. Merchant flour mills and iron works bartered their products for grain, forage, and provisions. This system of exchange

[7] Appendix I.
[8] Virginia, *Statutes at Large*, I, 267–268.
[9] Rhode Island, *Records*, II, 521.
[10] Douglass, *British Settlements in America*, II, 70; *Boston Newsletter*, Feb. 19, 1741.
[11] Advertisement, *New York Mercury*, Nov. 17, 1760, quoted in New Jersey, *Archives*, XX, 503.

continued throughout the Revolution, and upon the frontier until long after the establishment of the Republic. We have not sufficient evidence to show, what would be an interesting incident of primitive exchange conditions, whether the ratio of the value of produce and raw materials to the value of colonial manufactures expressed in that produce varied directly or inversely with the rise and fall in the export price of such commodities. Probably there was no general law distinguishable amidst the diversity of local conditions, but the total effect of the barter system was to confine manufactures to narrower areas of exchange than they would have commanded with more ample currency, and therefore to limit the size of individual enterprises and to prevent the economies of centralization. Not until the export market, which was more nearly than any other a cash market, began to influence colonial manufactures, do we discover larger undertakings and the grouping of similar industries at single points.

Meanwhile the English manufacturer, though engaged in but a larger circle of barter with the colonies, transacted business with his agents on a sterling basis; his debts did not depreciate while outstanding, like those of the colonial merchant, and the growing margin of exchange often became an increment to his profits.[12] On the other hand, lack of currency and its depreciation limited the purchasing power of the colonists, made English goods nominally higher, and thus to some extent checked their consumption.

The first effect of any expansion of colonial currency, even through issues of paper money, was increased trade activity, and with this greater purchases of foreign manufactures. As a plantation economist put it at the time: "By the chimæra of a fallacious cash, extravagancies are encouraged in favor of great consumption of British goods."[13] Writing in 1769, when the results of paper money had been impressed upon the colonists by long experience, an American publicist said: "Whatever other effect the granting of a paper currency may have, it will certainly increase the consumption of British manufactures in this province."[14] Probably any means of giving greater fluidity to currents of exchange benefited commercial manufactures. An early Philadelphia fair was unsuccessful, because only about $10 worth of goods were sold on account of the scarcity of money.[15] After Pennsylvania had devised its system of government notes supported by property security and bearing interest, industrial prosperity ensued, partly as a result of this device. In 1696 a committee of grievances in Maryland reported that settlers were leaving for Pennsylvania, "induced to it

[12] *Cf.*, however, Ashley, *Memoirs and Considerations concerning the Trade and Revenues of the British Colonies in America*, 50–55; Chalmers, *Revolt of the American Colonies*, II, 116.

[13] Douglass, *Discourse concerning Currencies*, 321.

[14] Lieutenant-Governor Colden to the Earl of Hillsborough, Oct. 4, 1769, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VIII, 189.

[15] Bishop, *History of American Manufactures*, I, 315, quoting Pastorius.

by the currency of money there which is not here."[16] In 1729 the governor of the former colony wrote to the proprietors: "Money or somewhat to answer its current effects in trade is certainly much wanted here. We may barter with one another our staple, tobacco; but to carry on and enlarge our trade abroad, and to invite artificers, shipwrights, etc., to settle amongst us, another species of currency in payment seems very desirable. New York, Pennsylvania, etc., are vastly improved in foreign trade as well as home manufactures by a paper currency."[17] Later Chalmers, writing from the British point of view, said of Pennsylvania: "The singular prosperity of the province may be attributed . . . partly to the prudent policy of promoting enterprise by feeding circulation with loans of paper money, gradual yet moderate"; and Benjamin Franklin first entered the field of public controversy in behalf of a new emission of these bills.[18]

This first effect of an increased circulating medium is borne out by the testimony of modern students of colonial economic conditions. Weeden says: "We may put the golden days of colonial and provincial ship-building in the first decades of paper inflation, before prices had been so generally advanced that our mechanics could not compete with the specie values of Europe."[19] Elsewhere, speaking of the New England iron works, he says: "Paper inflation, without doubt, stimulated these manufacturing enterprises at first; then that force soon expended itself. So long as the local demand equaled the supply, iron could be exchanged for other products, however poor the circulating medium. When the supply rose to an outflow, it was checked by cheaper production in other quarters. The Middle States had a better currency than our colonies had." When the depreciation gained headway, after the first emissions were absorbed, the result was to increase in the colonies the cost of production. In 1736 it was cheaper to build vessels on the Thames than in Massachusetts. Between 1735 and 1742 the quantity of molasses annually distilled in Boston fell off one-third.[20] After Massachusetts had returned to a more stable currency, by the redemption of a large part of its outstanding notes, in 1750 and 1751, Rhode Island, which still retained its depreciated paper, lost a large part of its West Indian trade, and with it declined distilling and the small manufacturing industries that helped to support that commerce.[21]

The depreciation of paper caused a general economic retrogression in New England, and apparently an increase of barter at the expense

[16] Maryland, *Archives, Proceedings of Assembly*, XIX, 539, 540.

[17] Governor Leonard to Charles Calvert, Oct. 28, 1729, in Maryland Historical Society, *Publications, Calvert Papers*, No. 34, pp. 68–81; *cf.* also Bruce, *Economic History of Virginia in the 17th Century*, II, 413.

[18] Chalmers, *American Colonies*, II, 158.

[19] Weeden, *Economic and Social History of New England*, II, 573; *id.*, 501.

[20] Weeden, *Economic and Social History of New England*, II, 484, 502; Boston Record Commissioners, *Records Relating to the Early History of Boston*, XIV, 231–239

[21] Potter and Rider, *Account of Paper Money of Rhode Island*, 68.

of cash exchange. Wages also fell. A writer of the period said that when the Boston town-house was erected, in 1712, a carpenter received 5 shillings a day, all in cash, while in 1739 he received but 12 shillings a day in paper, equal to two-thirds the former wage, "and even this is further reduced, by obliging him to take one-half in shop goods at 25 per cent or more advance above the money price."[22] Wages therefore had fallen from 75 cents a day in modern currency to 50 cents, partly paid in truck. This lowered the consuming power of the community by decreasing the income of an important element of the people, which in turn must have reacted upon trade. But these conditions, oppressive to commercial manufactures, caused greater attention to be given to the household industries supplying the immediate wants of each family. The writer already quoted, speaking of this effect, said "We find at present the homespun is more in wear by the country people, and spinning is more practiced than at any time since the beginning of the century." Interpreted in different terms, this illustrates the relation of prices to manufactures mentioned in the opening of this chapter. Paper money being depreciated, coin was scarce, prices of imported merchandise were high, and prices of commodities sold abroad were lowered in local markets by unfavorable exchange with England. Therefore commercial manufactures in the New England colonies declined, but homespun manufactures increased.

BUSINESS CRISES

The crises from time to time experienced by colonial commerce and industries were on one side closely related with the financial conditions just described, and on the other with political disturbances, especially the wars with the French and Indians; but other causes were involved in their occurrence and consequently in their effect on manufactures. Such crises were at first confined to particular colonies or groups of colonies, though as intercolonial trade developed their influence was felt in a greater or less degree throughout the provinces. The chief feature which they all had in common was the low price of colonial staples. The occasion for low prices was generally, but not invariably, an overstock in Europe, and seldom was it due solely to local conditions. The first such period of depression occurred in New England about 1640. During the previous ten years the country had been booming, because the political troubles of Great Britain drove to the New World a constantly increasing stream of settlers, so large compared with the resident population as greatly to stimulate all forms of business. These immigrants, from the thriftier working people and the well-to-do middle class of the mother country, brought with them supplies and capital. Later the politcal and military successes of the

[22] Douglass, *Discourse concerning Currencies*, 322; *id.*, 374.

Puritans reversed the status of the independents in Great Britain, and by opening at home great opportunities for the people who had been migrating, not only checked the tide of emigration, but caused its reversal; so that for some years more sailed eastward from New England than came to its shores from abroad. The population did not actually decline, on account of the rapid natural increase of the settlers in a new country; but the rate of growth fell off and with it the demand for provisions and improved land. Fewer ships came to the colonies, and therefore less British merchandise. So long as land and provisions were rising constantly in price, there had been every inducement to exchange them for imported goods rather than to manufacture at home. When the check came, there was a sudden and disastrous fall in prices of land, produce, and American commodities. Cattle a year previously worth $100 could not be sold for a fourth or fifth that sum, land was a drug on the market, and there was nothing to exchange for the foreign manufactures that still arrived. Winthrop wrote: "These straits set our people on work to provide fish, clapboards, plank, etc., and to sow hemp and flax (which prospered very well) and to look out to the West Indies for a trade in cotton."[23] The result was a general stimulation of both lumbering and ship-building and of the homespun industries.

During the seventeenth century similar crises, due to the low price of tobacco, occurred repeatedly in Virginia, where they were the inevitable accompaniment of one-crop cultivation. Towards the close of that century a general depression spread over the colonies. In 1685 the people of Massachusetts were reported to be "miserably poor," their fishing and fur trade declining on account of troubles with the French, while three great fires in Boston had destroyed property to the value of £150,000.[24] In 1690 the lieutenant-governor of Virginia reported that half the previous year's crop was still unsold, and the people were "very much inclined to go upon the linen and woolen manufacturing."[25] Sometimes supplies failed to arrive when the colonists were ready to purchase them. The year following the report just quoted the Virginia executive wrote: "The winter begins to set in and the people are in great want of clothing. If merchants send a considerable quantity of clothing by this time of the year it will prevent the going upon the linen and woolen manufacture."[26] In 1697 Andros reported from the same colony: "Some few for want of goods out of England go upon the manufacture of linen, woolen, tanning,

[23] Winthrop, *History of New England*, II, 37; Winthrop, *Journal*, 213; Hubbard, quoted by Bishop, *History of American Manufactures*, I, 298.

[24] Randolph to Dr. Lloyd, Mar. 1685; in Prince Society, *Publications*, XXVII, 16; *New England Historical and Genealogical Register*, XXXVII, 268.

[25] Lieutenant-Governor Nicholson to Lords of Trade and Plantations, Jan. 26, 1690, in Sainsbury, *Abstracts*, IV, 354.

[26] Lieutenant-Governor Nicholson to Earl of Nottingham, Nov. 13, 1691, in Sainsbury, *Abstracts*, IV, 439.

and making shoes, mostly for their own use."[27] In 1706 the secretary of the province suggested that ships with clothing would be welcome, "for some parts are fully applying themselves to the making of linen and woolen, which an early and good supply in some measure would dash."[28] In 1708 the decline of trade forced the colonists to make their own clothing, though possibly they had the means wherewith to buy were supplies at hand. However, two years later Lieutenant-Governor Spottswood reported: "The people not being duly supplied with clothing from England, and the market for tobacco declining, they had been obliged to turn their hands to the woolen manufacture."[29] Similar conditions prevailed in Maryland. About 1695 these provinces had been afflicted with a cattle epidemic, which carried off nearly 100,000 head of stock; and the subsequent records of the Maryland assembly contain frequent references to the distress of the people and their emigration to the northern colonies and to Carolina. This led to the prosecution of home manufactures, especially in Somerset and Dorchester counties.[30] In 1701 James Logan wrote to William Penn from Philadelphia that the West Indian trade was dead; and two years later Colonel Quarry reported that the commerce of New York was ruined.[31] In 1705 Pennsylvania was distressed by three conditions: the practical bankruptcy of the tobacco colonies, the action of Spain in closing her West Indian ports to North American products, and the competition of Great Britain in the Sugar Islands. So long as grain was under 5 shillings in England, that country, on account of its cheaper labor and more favorable freights, could undersell American flour and bread in the West Indian market.[32] Meanwhile there was the usual conjunction of a scarcity and of high prices for European wares. The same general conditions affected New England, with results similar to those in the southern colonies. Speaking of 1705, the Massachusett merchant, Banister, in his *Discourse on the Trade of New England*, referred to the commercial conditions that were depressing the commerce of the northern provinces, and added: "Since the prices of English goods became so dear, twenty years ago [writing in 1714 or 1715], this put the colonies on making buttons, stuffs, kerseys, linsey-woolsey, shalloons, flannels, etc., which has decreased the importations of those provinces about £50,000 per annum."[33] In 1709 Governor Dudley,

[27] Governor Andros to Lords of Trade, Apr. 22, 1697, in Sainsbury, *Abstracts*, v, 302, 303.

[28] Secretary Jennings to Lords of Trade, Oct. 14, 1706, in Sainsbury, *Abstracts*, vii, 470.

[29] Lieutenant-Governor Spottswood to Lords of Trade, Mar. 20, 1710, in Sainsbury, *Abstracts*, viii, 280; *cf.* Secretary Stanhope to Lords of Trade, Feb. 1715, in New Jersey, *Archives*, iv, 348.

[30] Bishop, *History of American Manufactures*, i, 319; Maryland, *Archives Proceedings of Assembly*, xix, 250, 539, 581.

[31] James Logan to William Penn, Dec. 1701, in Pennsylvania Historical Society, *Memoirs*, ix, 81; letter from Robert Quarry to the Board of Trade, June 16, 1703, British Museum, *Harleian Manuscripts*, 6273, *f.* 1, printed in O'Callaghan, *Documents Relative to the Colonial History of New York*, iv, 1045.

[32] James Logan to William Penn, June 22, 1705, in Pennsylvania Historical Society, *Memoirs*, x, 53.

[33] Quoted in Lord, *Industrial Experiments in the British Colonies*, 134.

of Massachusetts, reported that the woolen trade with England had abated greatly and the people were clothing themselves with their own wool.[34]

Both of the preceding crises had been accompanied by a scarcity of currency; and the great crisis of 1750, in New England, was largely occasioned by a money panic. A severe drought, which caused such scarcity in 1749 and the year following that forage was imported from Great Britain and the middle colonies, the drain of the French wars, and the embarrassments attending the resumption of specie currency in place of the almost worthless paper, coöperated to depress trade.[35] About the same time the Land and Manufactures Bank, a scheme for issuing bills of credit upon land security, redeemable in produce or manufactures, was suppressed.[36] British legislation hostile to colonial commerce and industry also was causing concern. In 1748 the fishing fleet had declined one-half from its numbers a few years before, and the following year, through poverty or paucity of inhabitants, fifty-eight towns refused to send two members to the General Court.[37] In 1751 a body of citizens, unable to get either paper or coin for their labor or produce, petitioned for a remission of taxes.[38] In the midst of this crisis there was agitation in favor of home manufactures, and as a result the Manufactory House was erected in Boston.

During colonial days, therefore, a period of depression reacted upon many manufactures quite differently than at the present time. Those industries that were pursued in the household were revived and extended by the very conditions that deadened trade and brought to a halt the production of commodities for export. The spinning-wheel and the loom were plied with more diligence when shops were deserted and shipping lay idle at the wharves.

INFLUENCE OF WAR UPON COLONIAL MANUFACTURES

One influence of a foreign war upon colonial industry was direct and obvious. European markets were restricted, sea trade was interrupted, and freights rose; and all of these conditions made it more difficult to ship lumber, provisions, and other produce abroad and to import manufactured goods. Therefore, not unusually the price of American commodities declined in the home market and the price of foreign goods rose simultaneously, thus throwing the people upon their own resources for articles that they ordinarily obtained through commerce. But this result did not always follow, chiefly for two reasons: a very profitable trade, at high prices, sometimes sprang up with neutrals or even at

[34] Lord, *Industrial Experiments in the British Colonies*, 132.
[35] Weeden, *Economic and Social History of New England*, II, 676.
[36] Weeden, *Economic and Social History of New England*, II, 485–491; Davis, *Tracts Relating to Currency of Massachusetts Bay*, 150, 151.
[37] Douglass, *British Settlements in North America*, I, 537; *State of the British and French Colonies in North America*, 132.
[38] Boston Records Commissioners, *Records Relating to the Early History of Boston*, XIV, 231, 238–239, 280–281.

times with those in commercial alliance with the enemy, which more than repaid the risks of the traffic; and this, combined with the local demand for military supplies and for provisions for the navy, made a market greater than that which was lost through hostilities. When this happened, the readjustment of trade at the close of the war was generally attended by a period of depression.

Chalmers frequently alludes to the encouragement given by war to colonial manufactures. He says: "Though the Virginians saw not the enemy during King William's war, their commercial interests were affected in proportion to the greatness of the embarrassments of England." This war was one of the main causes of the crisis that induced the assembly to enact laws encouraging home manufactures. Speaking of Maryland, the same author says: "In order to balance the interruption of foreign traffic, she offered rewards to domestic manufactures and promoted illicit commerce." In connection with Queen Anne's war he remarks: "The Virginians resumed a measure which a similar necessity had induced them to adopt during the late reign: when European supplies were withheld, they engaged in manufactures of linen and wool."[39] In 1704 the lieutenant-governor of New York, in an official communication, observed that the consumption of flour, the staple manufacture of that province, having ceased in the Spanish West Indies on account of the war, the inhabitants within his jurisdiction were much impoverished.[40] About the same time we have reports of the recent progress of homespun industries within the same colony. Lieutenant-Governor Bull, of South Carolina, reported that during the war with France and Spain, in 1744, rice fell in price so that one hundredweight was often bartered for a yard or less of cheap Welsh cloth costing in England a shilling. Consequently, "the people of Carolina were driven by this distress to the necessity of weaving coarse cloth of cotton and wool for their negroes."[41]

However, after Great Britain began to wage important campaigns in North America, a war caused the expansion of local industries and increased importations. Colonial producers supplied, at least to their own contingents, not only provisions, but also to some extent firearms, cannon, shot and shell, and gunpowder, as well as clothing, boots, and shoes. The emergency requirements of a campaign were met largely by the services and skill of colonial artisans. The increased activity of commerce during the last of these contests was thus described by a colonial writer, in 1765: "The importation from Great Britain has surprisingly increased during the war. The lessening of them from what it was in that time is unavoidable from the recalling or disbanding of the greater part of the army, but chiefly to the entire stop

[39] Chalmers, *American Colonies*, I, 260, 262, 392.

[40] Lieutenant-Governor Ingoldsby to Lord Nottingham, June 14, 1704, in O'Callaghan, *Documents Relative to the Colonial History of New York*, IV, 1090.

[41] Lieutenant-Governor Bull to Earl of Hillsborough, Sept. 8, 1768, British Museum, *King's Manuscripts*, 205, in *British Transcripts*, Library of Congress, 27.

to the trade with the French colonies, who were supplied from the British colonies while the commerce of France was shut up."[42] Generally during hostilities the colonial policy of the mother country was relaxed, so that the trade and industry of the plantations were unrestricted.

Nevertheless, the final results of wars were impoverishment and depression. They rendered more acute the crisis of 1750, in which year a Massachusetts writer, commenting upon the Cape Breton expedition, said: "We almost made ourselves bankrupts, not only with respect to money, but also with regard to labor, the worst bankruptcy that a community can suffer; for we expended some thousands of lives, which were lost by a mortality consequent on the surrender of Louisburg, who were some of the flower of the people."[43] Ten years later an English traveler related that the Irish settlers in New England had discontinued the manufacture of linen because "at the breaking out of the war, the price of labor was enhanced so much that it was impossible to carry it on."[44]

The colonial wars appear to have been followed by a scarcity of money as compared with the amount in circulation during hostilities. This was caused by remittances to England, when peace was declared, in return for the manufactures which were crowded into the market as soon as ocean freights and insurance fell. That was the cause assigned for these post-bellum crises by John Adams, who referred to them in the following words: "I am old enough to remember the war of 1745 and its end; the war of 1755 and its close; the war of 1775 and its termination; the war of 1812 and its pacification. Every one of those wars has been followed by a general distress, embarrassments of commerce, destruction of manufactures, fall of the price of produce and lands."[45] Doubtless the homespun industries that arose during the interruptions of trade declined for a time in the face of renewed supplies of foreign manufactures, but if so succeeding embarrassments caused their resumption. But the staple manufactures of the colonies, which are probably those meant by Adams, may have suffered more severely and for a longer time, for the overstocks of foreign manufactures that followed a war, though they depressed prices and may have widened consumption temporarily, were to commerce what overproduction more recently has been to industry. These supplies were paid for with the ready money accumulated during the war, when cash business increased and scarcity checked the consumption of im-

[42] Colden, "Account of the State of the Province of New York," Dec. 6, 1765, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VII, 799.

[43] *Some Observations Relating to the Present Circumstances of the Province of Massachusetts Bay*, 4–5

[44] Burnaby, *Travels through North America*, 135.

[45] John Adams to William E. Richmond, Dec. 12, 1819, quoted in White, *Slater*, 17, also in Adams, *Works*, X, 384; *cf.* the Petition of the Merchants of the City of New York relating to Foreign Coin, in O'Callaghan, *Documents Relative to the Colonial History of New York*, IV, 1133–1135.

ports, and they were not balanced by shipments of colonial produce to Europe. Consequently when the people resumed their normal occupations, their inability to make further purchases abroad—due to the present congestion of foreign goods at home—prevented their marketing advantageously articles prepared for export. So after a war there was apt to be a conjunction of low prices for foreign merchandise, but without the means of purchasing even at those terms, with low prices of export commodities.

PRICES OF PRIMARY MANUFACTURES IN THE COLONIES

Generalizations as to colonial prices rest upon insecure grounds, because we have no complete record of these prices; they fluctuated widely at different seasons and at places more or less conveniently situated for transportation, and they were expressed in currencies of uncertain and changing value or in produce at rates varying widely and arbitrarily from the cash standard. Moreover, existing data often leave to inference the quality of the article stated and the exact unit of measurement. Consequently, if the results of an investigation of this subject are meager and conclusions are expressed without assurance, this follows not so much from a superficial study of the evidence as from an experience of its contradictions and uncertainties.

Though sterling denominations were used in the colonial money of account, the coins in actual circulation were mostly Spanish silver dollars and their fractions, of two different alloys and valuations. Of these, that of the greater fineness and in more common use was the piece of eight, containing nearly eight grains more silver and worth in bullion between 1 and 2 cents more than the American dollar of the present day. But as the coins in circulation in the colonies were clipped or otherwise depreciated in intrinsic value, and this was recognized in their trade ratio to sterling, we may consider them as not more than equivalent to our current coin. This has been assumed in the accompanying reductions of colonial prices to American money; but even did this assumption involve a slight margin of error, it would affect but a part of the citations, many of which it has been possible to refer to bullion values.[46]

As the purchasing power of money of the same nominal value has varied widely at different ages, the following miscellaneous data will afford some basis for a comparison of colonial conditions in this respect with those of the present. A Salem grocery bill, dated 1629, contains such items as: loaf sugar, 30 to 35 cents a pound; pepper, 45 cents a pound; nutmegs, 10 cents an ounce; starch, 10 cents a pound; Castile soap, 15 cents a pound; almonds, 30 cents a pound; salad oil, $1.40 a gallon; candles, 12 cents a pound; rice, 8 cents a pound; butter,

[46] Appendix I.

10 to 15 cents a pound; vinegar, 45 cents a gallon; cheese, 12 to 15 cents a pound.[47] In 1775, at the other extreme of the colonial period, in the same town, loaf sugar was 14 cents a pound; cheese, 5.5 cents a pound; butter, 11 cents a pound; molasses, 20 cents a gallon; chocolate, 17 cents a pound; candles, 10 cents a pound; beef and mutton, 4 to 5 cents a pound; rye or Indian meal, 62 cents a bushel.[48] During the sixteenth century common laborers received in the neighborhood of 40 cents a day, and in 1775 their wages are given as 57.5 cents a day.[49] Board in the country cost about a dollar a week; and in 1748, in Philadelphia, the board of two gentlemen, including lodging and three meals a day, but not fuel, was about $2.60 a week.[50] In 1771 a New England importing merchant, engaged in large transactions, paid for his board in Boston $2.66 weekly;[51] and in 1775 a New York City lawyer paid $120 a year each for the board of himself and his sister.[52] Without attempting more than a very loose estimate, we may conclude that during most of the colonial period wages were about one-fifth of their present rate and that their purchasing power, in relation to the standard of living, was fully five times what it would be at present. With this background for comparison the following prices of the staple primary manufactures of the colonies, at different dates, become more significant.

Of the timber products, inch boards were fairly representative, though in early times they were relatively less important than riven timber as an article of export. Until sawmills became common, boards were sawed by hand; and like clapboards, staves, and shingles, they were sold by tale rather than by superficial feet. The latter method of measurement seems to have been an American innovation and followed the introduction of sawmills. Where the sawmills were so scarce that the prices set by hand-sawyers prevailed, pine boards sold, during the sixteenth century, for about $10 per 1,000 feet. The lowest prices were reached in the New Hampshire and Maine milling districts, between 1660 and 1690, when inch boards cost $3 and $4.50 per 1,000. This was followed in New England by a gradual rise in price, probably caused chiefly by the increasing difficulty of getting timber convenient to water-carriage and by British forestry regulations, so that from 1700 onward the quotations of which we have record always exceeded $5. Though lumber must have been lower upon the upper Hudson, its cost in New York seems to have ranged between $6 and $10, which was the price in New England after the middle of the eighteenth century. In Pennsylvania and the southern colonies the early prices of sawed

[47] Felt, *Annals of Salem*, I, 511, 513.
[48] Essex Institute, *Historical Collection*, II, 259.
[49] Weeden, *Economic and Social History of New England*, II, 877, 900.
[50] Kalm, *Travels into North America*, I, 24.
[51] Stephen Collins and Co., *Mercantile Papers, Wm. Barrell Ledger*, 1771, 320.
[52] *Lawyer's Day Book*, 1775, 104.

lumber were higher, remaining in the neighborhood of $10 per 1,000 until the Revolution. In 1740 South Carolina by law fixed the price of cypress boards at $12 and of pine boards at $8.56; and in 1760 pine boards for export from Charleston were rated worth $12.25. But prices fell when sawmills were built in the back country, and after the Revolution the southern lumbermen were supplying boards for about half this sum.[53]

The price of pitch and tar in America was influenced by prices in the London market, and these in turn were governed by the exactions of the Swedish tar monopoly. This monopoly appears to have controlled prices early in the eighteenth century; at least the cost of Swedish tar nearly trebled about this time.[54] This led to the promotion in the colonies of the production of those commodities, together with other naval stores, by the bounties mentioned in a previous chapter; and thereafter these bounties formed a factor in the price received in America. But the effect of the bounties, which amounted approximately to the freight between America and England, was rather to open a broader market and thereby to stimulate larger production than to raise the price in the colonies. The conditions under which bounties were given also occasioned an improvement in the quality of American pitch and tar, which in turn became a factor in their price after these laws had become fully effective.

In 1670 Plymouth Colony offered a monopoly of the trade in tar to any person who would guarantee to receive all that was manufactured at $1.33 a barrel. Before 1700 there are other quotations as low as $1. About 1700, when the British authorities were making inquiries with a view to obtaining supplies for the royal navy from America, contractors offered to furnish tar in large quantities at prices ranging from $3 a barrel in New England to $2 and thereabouts in Maryland and the Carolinas.[54] Early in the eighteenth century good tar commanded about $2 a barrel at the northern ports, though in the Carolinas it was sometimes sold as low as $1.25 a barrel. By 1724 methods of production had improved and the bounty had encouraged the manufacture, so that the average price in America was estimated by the British officers at $1.55 a barrel.[54] In 1721 New England tar sold for about $1.50 a barrel, and two years earlier South Carolina had made the same commodity legal tender for taxes at $1.25. About the middle of the century the average price in New England ranged between $2 and $2.50, though in 1769 tar was quoted at only $1.60 a barrel in Rhode Island, and the wholesale price was frequently under $1.25 at Norfolk.[55] As compared with tar, pitch was much more expensive, and in the South was the more profitable product. Turpentine, which was

[53] *Cf.* Appendix II.
[54] Lord, *Industrial Experiments in British Colonies*, 60; *id.*, 60–61; *id.*, 80.
[55] Appendix III.

distilled in New England from local and southern tar, sold for about 50 per cent more than the material from which it was extracted. The price of tar and its immediate derivatives therefore followed a different law from that of the price of lumber, falling in the second century of settlement while the former rose. The bounties may have been an influence in this direction, but so also was the extension of occupied territory, which caused lands to be cleared distant from water courses, where it was not profitable to haul logs to mill for lumber, but where the manufacture of a compact commodity like tar still remained profitable. The production of potash began to extend during this period for similar reasons, and these inducements were reënforced by rising prices caused by its increased use in the industrial arts.

The cost of building ships must have risen rapidly after the middle of the eighteenth century. In the earlier records there are few instances where the price reached $14 a ton, and about the year 1700 small vessels could be built in the northern colonies for less than $9. The seventeenth century prices in New England ranged between $9 and $15, but in some cases it is known that this was partly in barter and that the estimate included the vessel fully equipped for sea. Virginia prices for hulls alone were $9 and $10 a ton. At the close of the Revolution the cost in New England of the hull alone was $15 a ton, and in Maryland $20; fir sloops and schooners built near Albany cost $27.50; the price per ton of live-oak ships in South Carolina was about $23 for the hull alone, or $35 to $40 equipped for sea. Apparently oak vessels could be built in eastern Massachusetts and Philadelphia much more cheaply than at Charleston.[56]

An inventory of the Lynn Iron Works, in 1653, appraised the metal at the two plants as follows: cast iron, which may include hollow ware, at Lynn $18 and at Braintree $24 a ton; blooms, at Lynn $64 and at Braintree $48 a ton. Thirty years later Spanish bars sold at Boston for $76 a ton, while Swedish iron was a trifle cheaper.[57] Early in the eighteenth century, when the furnaces of the middle colonies and Virginia began to export pigs, their tidewater value ranged around $20. In the middle of the century they sold at Pennsylvania furnaces for $15.50 and at Philadelphia for $22; and furnace books and mercantile accounts show that seaboard prices clung closely to $20 until after the outbreak of the Revolution.[58] Bar iron fluctuated more in value. Port quotations rose to over $100 a ton for some years after 1700, but fell to two-thirds that amount in the second half of the century. They remained under $70 until after 1776, when war demands and currency depreciation raised prices. In contrast with pigs they sold for more at the forge than after delivery at tidewater, because forgemasters had a monopoly market for a limited quantity of bars at the

[56] Appendix IV.
[57] Weeden, *Economic and Social History of New England*, I, 307.
[58] Appendix V.

former point.[59] Hamilton in his report on manufactures stated that before the war with England the average cost of bars in the colonies had been $64 a ton, and that following peace the price had risen to $80 on account of the increased demand for manufacturing.[60] Iron values seem to have been little affected by British measures to promote its production in America, and evidently the loss of the transatlantic market following independence did not depress domestic prices. Soon after the Revolution the States began to import unmanufactured iron from Russia and Sweden. Steel, which was used relatively little by colonial artisans, varied in price according to its quality and origin, but during the eighteenth century ranged between $175 and $225 a ton.[61]

The price of flour was subject to great variation, both at different seasons and from year to year. In local markets a hundredweight of flour usually sold for about the same as 3 bushels of wheat, and at the same rate, for equal weights, as ship's bread. In an age when every farmer took his own grain to the mill, and had it ground for toll in kind, there was little chance for speculation to affect prices in the domestic market; but the quotations for merchant flour, at export points, responded to foreign demands. The scanty evidence at hand indicates that during the seventeenth century prices were at times very high. In 1629 wheat flour is rated at $3 a bushel,[62] and in 1697 at between $11 and $12 a barrel.[63] There had been an intervening period of moderate prices, but thereafter for some years quotations maintained a high level. In 1721, again, very low prices, possibly under $1 per 100 pounds, are quoted in New England; and wheat was but 3 shillings, in depreciated currency, a bushel.[64] After this date we have a fairly continuous record of flour values in the middle colonies. From 1721 until 1748 quotation ranged between $1 and $1.50 a hundredweight, with an average probably not far from midway between those figures. The latter year prices rose to $2.80 a hundredweight, and, with the exception of a few short seasons, they remained above $2 from that time until the Revolution. In other words, during the first part of the century flour cost in port towns under $3 a barrel, and from the middle of the century until the war with England, following the abrupt rise in 1748, it usually cost above $4 a barrel.[65]

Though not a primary manufacture, rum was closely associated with lumber and provisions in the export trade. During the seventeenth century the price of West India rum in New England ranged from 27 cents a gallon to over a dollar. After distilling became common in the colonies the price seldom rose above 50 cents. New England

[59] Acrelius, "History of New Sweden," in Pennsylvania Historical Society *Memoirs*, XI, 169.
[60] *American State Papers, Finance*, I, 138
[61] Appendix *V*.
[62] Felt, *Annals of Salem*, I, 511.
[63] Weeden, *Economic and Social History of New England*, II, 888.
[64] Weeden, *Economic and Social History of New England*, II, 891.
[65] Appendix VI.

rum was cheaper than the imported. Quotations after 1700 are fairly numerous as compared with those of other commodities, but their movement is not particularly significant. Prices were low between 1720 and 1730, never rising above 40 cents a gallon and several times falling to 20 cents. Probably this was due to the low price of molasses and an uninterrupted West Indian trade, though during the same period both iron and provisions also were lower than they were later. After 1740 the prevailing quotations are above 40 cents, though usually less than 50 cents; but in 1775 rum sold at Salem for 28 cents a gallon.

PRICES OF TEXTILES AND CLOTHING

Three or four fabrics of wool, and as many of linen and cotton, may be taken as representative of the dozen or more of each class common in the colonial market. Broadcloths, serges, and kerseys were generally worn as outer clothing, the first for finer garments and the latter for every-day use. The prices of such goods varied so widely with quality and difference of width, which often pass unnoticed in colonial entries, that we have no means of judging from mercantile records what the fluctuation was from period to period. Most broadcloth retailed between $2 and $3 a yard, though prices as low as $1 and as high as $4 occur. No significant change of price seems to have taken place between 1650 and 1775, apart from temporary fluctuations due to trade conditions.[66] During the seventeenth century serges cost in New England about 70 cents a yard, and the Virginia price, perhaps on account of differences in quality, seems to have been somewhat higher. In 1756 German serges were sold in Charleston for 96 cents a yard and in Virginia for about $1.10. Kerseys appear to have cost more than serges during the seventeenth century, ranging from 80 cents per yard to double that amount; but from 1721 to 1731 a Philadelphia firm was selling them at from 50 to 60 cents. American woolens, which were coarser and more poorly finished than those imported, cost considerably less. In 1673 the New Englanders were said to make no cloth worth more than a dollar a yard;[67] between that date and the end of the century Boston serges were reckoned worth between 50 and 60 cents;[68] and at the close of the Revolution Connecticut camblets were valued at 44 cents, while white woolen cloth, woven in New Hampshire, sold locally for about a dollar.[69]

[66] Many of these textile quotations are taken from various manuscript accounts. *Cf.* also Bruce, *Economic History of Virginia in the 17th Century*, II, 189–190, and Weeden, *Economic and Social History of New England, passim; e.g.*, I, 107, 248, 370, and II, Appendix A.

[67] Randolph, "The Present State of New England," in British Museum, *Additional Manuscripts*, 28089, *f.* 6, in *British Transcripts*, Library of Congress, 3; Bishop, *History of American Manufactures*, I, 314.

[68] Suffolk, *Probate Records*, XIII, 743, cited in Weeden, *Economic and Social History of New England*, I, 389.

[69] Chastellux, *Travels in North America*, I, 39; New Hampshire, *State Papers*, VIII, 927.

Of the flax fabrics, osnaburgs, which were coarse, heavy, and worn for outer garments, were among the most common, though relatively they were a more important article of merchandise in the southern colonies than farther north. During the seventeenth century they cost in Virginia about 30 cents, but after 1700 the price declined. In 1731 and 1734 they were retailed in Philadelphia for about 17 cents a yard; and at Charleston, in 1749 and 1756, they sold for 15 cents and even lower. Calicoes appear in New England accounts as early as 1640, at 24 cents a yard; in 1733 blue calico was 30 cents at Philadelphia; in 1749 Indian calicoes retailed at Charleston for 41 cents, and in the midst of the Revolution they were to be had for 50 cents a yard. From the middle of the eighteenth century onward sheeting, bleached and unbleached, was sold at 25 to 40 cents a yard, and Holland linens, which in 1640 were as high as 80 and 90 cents, fell in the following century to 63 cents, 46 cents, and finally to 37 cents. German linens were quoted at Philadelphia, in 1735, as low as 12 cents a yard. Checked shirtings ran from 30 to 60 cents. American linens commanded relatively a better price, as compared with imported goods, than did domestic woolens. About 1640 New England homespuns, probably of flax or flax and cotton, were valued at 20 and 30 cents a yard;[70] in 1673 none exceeded 60 cents a yard;[71] in the middle of the eighteenth century Rhode Island tow cloth was rated at about 35 cents a yard.[72] Londonderry linens sold for about 22 cents a yard, or from 20 to 40 per cent more than corresponding fabrics from Europe.[73] During the Revolution homespuns commanded nearly the same price as imported goods, or from 45 to 70 cents a yard.;[74] but in New Hampshire, about the end of the war, this price fell to 20 and 25 cents.[75] Linsey-woolsey, a staple American household fabric, cost 30 cents a yard in 1640, but fifty years later was apparently valued at only half this amount.[76] Unfortunately the prices from merchants' accounts of which we have record do not specify Londonderry and Germantown goods, which were probably the best reputed in the colonies.

Wool was about 20 cents a pound in New England in 1670 and the years immediately following, when our first definite records of price occur;[77] and at the same time carded American yarn was about 50 cents a pound and worsted yarn a dollar.[78] The Philadelphia price of

[70] Suffolk, *Probate Records*, II, 3; *cf.* Massachusetts Bay, *Records*, I, 316.
[71] Randolph, *Present State of New England*, in British Museum, *Additional Manuscripts*, 28089, *f.* 6, in *British Transcripts*, Library of Congress, 3.
[72] Potter, *Paper Currency in Rhode Island*, 165–167.
[73] Governor Wentworth to the Lords of Trade, Mar. 25, 1768; in British Museum, *King's Manuscripts*, 205, in *British Transcripts*, Library of Congress, 23.
[74] Bourne, *Wells and Kennebunk*, 502.
[75] New Hampshire, *State Papers*, VIII, 927.
[76] Suffolk, *Probate Records*, II, 10, 11; IX, 81; XIII, 180.
[77] Weeden, *Economic and Social History of New England*, II, 884.
[78] Suffolk, *Probate Records*, VII, 113.

wool in 1694 ranged from 14 to 18 cents.[79] After 1678 New England wool fell to about 12 cents a pound, a rate which was maintained without significant variation until after 1750.[80] By 1695 worsted yarn made in Boston had fallen to about 70 cents and carded yarn to 25 cents.[81] In Connecticut, two years earlier, first quality yarn was rated at 75 cents and second quality at 48 cents a pound.[82] From the few quotations prior to 1750 it would appear that the price of imported cotton ranged between 15 and 30 cents a pound during the century ending with that date; about 1745 it rose to nearly the latter figure, and continued at 25 cents and over until the Revolution. The London price at this period was about a shilling sterling. During the war with England this price rose to 50 cents and over—a rate maintained, with variations of 20 or 30 per cent, throughout the Revolution and until the adoption of the Constitution.[83] Although the cost of wool also increased during hostilities, the relative rise was not so great. Until 1750 flax sold in the colonies for between 5 and 10 cents a pound, making it by far the cheapest textile fiber except hemp, but about the middle of the century it rose to 12 cents, and thereafter appears seldom to have fallen below that price.

The cost of apparel did not change radically during the hundred years ending with American independence.[84] Wool hats, which were worn by most boys and men, cost from 40 to 80 cents, according to quality. In 1761 "Carolina" hats retailed for about 66 cents in Virginia, and after the Revolution similar hats sold for $1 in the Shenandoah Valley. Fine beaver hats are charged to customers in store accounts at $2.50 and $3, while others of cheaper grade, though denominated "castors," commanded half that sum. The price of men's shoes, which were more expensive than women's, increased from 50 and 75 cents a pair in the earlier days of settlement to 75 cents and $1 about 1700, and nearly double that price during the Revolution. Colonial leather cost from 10 to 17 cents a pound. Coarse clothing of English manufacture was imported. In 1714 a Boston wholesaler notified "merchants, inland traders, and others" that he would auction a large stock of men's wearing apparel, including coats, breeches, shorts, and neck-cloths. Fifty years later similar advertisements still appeared in Boston newspapers.[85] The London price of men's jackets was about $1.50 and that of breeches one-half this amount. Men's worsted hose, not improbably of German-

[79] *Manuscript Account Book*, 905, Pennsylvania Historical Society Library.

[80] Weeden, *Economic and Social History of New England*, II, Appendix A; in 1766, good wool was worth 24 cents a pound in Rhode Island and 25 cents in Virginia; Hazard, *Thomas Hazard*, 93; *cf.* also 149.

[81] Suffolk, *Probate Records*, XIII, 743.

[82] Hartford, *Probate Records*, 1692; Phineas Wilson.

[83] See Appendix VII.

[84] The following prices are quoted from merdhants' account books.

[85] *Boston Newsletter*, Mar. 8, Mar. 29, Apr. 5, 1714; *Boston Gazette*, May 31, 1764.

town make, sold by the dozen in Philadelphia for $6.40, which was about the price of similar imported goods in New York. Coarse worsted hose were worth 35 cents a pair in New England, and fine hose from $8 to $12 a dozen.

While it is not possible to generalize with certainty from the scanty data available as to fluctuations of prices affecting particular commodities or single years and seasons, certain broad tendencies are manifest. In the eighteenth century, and especially after 1750, markets for colonial products tended upwards, and it is probable that at the same time the cost of living was rising.[86] Among the principal causes for this must be counted the rapid growth of population and extension of settled territory. On a smaller scale the same thing had happened in New England during the ten years ending with 1640.

The rise in the price of raw materials which were seldom exported indicates the growing activity of home manufactures. To this influence in part was probably due the increased price of flax and hemp, and possibly of cotton, wool, and iron. If wheat may be taken as representative of agricultural products, there was not a corresponding upward tendency in those commodities during the eighteenth century. In the seventeenth century the New England price of wheat seldom fell below 60 cents a bushel and seems to have fluctuated around a median rate of about 80 cents. During the following century, when the middle colonies became more important producers, this price fell somewhat. Between 1700 and 1750, omitting four years for which there are quotations when there was abnormal plenty or scarcity, the median price seems to have been about 70 cents; and between the latter date and the Revolution, though this value rose slightly, it did not attain that of the previous century. This consideration, and others that might be adduced from the price records of the time, suggest that agriculture was relatively less profitable as compared with other industries than at an earlier period.[87] The price of British manufactures was not yet influenced by new inventions and did not decline sensibly during the century preceding the Revolution. The effectiveness of British competition, therefore, may have been less than during the first decades of the Republic. It is not improbable that about the close of the colonial period greater equality of manufacturing conditions prevailed in Europe and America than later, and that this was reflected by the increasing demand in the latter country for raw materials used in manufacture and by rising prices for many products of home industry.

[86] There is an allusion to the rising cost of living in two letters dated 1759 in British Museum, *Additional Manuscripts*, 32901, *f.* 109; *cf.* also Lieutenant-Governor Colden to Lords of Trade, March 9, 1764, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VII, 612.

[87] Partly because farm production grew faster than the island market for provisions; *cf.* House of Commons, *Journal*, 1737, XXIII, Appendix II, 116.

CHAPTER VII

THE RELATION OF CAPITAL AND LABOR TO THE PROGRESS OF COLONIAL MANUFACTURES

Distribution and investment of capital, 144. Profits and interest, 147. Manufacturing capital, 151. Scarcity of labor, 152. Comparative wages in America and Europe, 155.

DISTRIBUTION AND INVESTMENT OF CAPITAL

The first English colonial enterprises were supported entirely by British capital, and organized upon a company or coöperative basis. As settlements were established and extended, the title to the property of the colonies became vested in growing proportions in their residents, with corresponding dispersion of ownership. The British collective capital of the early ventures was speculative, while the individual savings of the colonists sought familiar and well-tried investments. Until the very end of the colonial period speculative enterprises in America, including the most important manufacturing undertakings, were financed very largely with English or German money, though occasionally wealthy colonists coöperated in these projects.

All our evidence, both from different sources and with reference to different phases of the economic life of this period, centers towards the fact that poverty as applied to the colonists was another term than when applied in Europe. There was from a very early date an abundance of subsistence wealth, and except in remote or recent settlements the people were better fed and probably upon the whole better clad and housed than the corresponding classes of the mother country. Wages were higher and the cost of living was lower than abroad; and upon this we may base the corollary that labor, with equal effort, produced more wealth than in older countries.[1] Yet travelers and British officials often refer to the colonists as poor and their manner of living as mean; and in their own complaints the people, through their public representatives, not infrequently speak of poverty and distress. In the colonial towns, far as they were removed from the social problems of modern urban life, the destitute at times caused serious concern and the unemployed were a burden to the community. Conditions apparently so contradictory resulted from the forms which colonial wealth assumed and the way in which it was distributed. The property of the colonists consisted principally of land, improvements attached to the land, and its produce. So far as the latter supplied consumption there was abundance; as far as visible capital and elegance of living required something beyond this there was poverty. Workers detached from

[1] *Cf.*, however, Corning, *The First Iron Works in America*, 9.

the land and physically unfitted to till the soil or to engage in kindred occupations were without some of the resources of older and industrially more complex communities and might suffer actual want. Because the labor of the people was absorbed so largely in occupations that could not well be organized upon a capitalistic basis, wealth was distributed more evenly; a smaller proportion of it was devoted to display and other uses that make its existence generally apparent; and few persons enjoyed a surplus income which they could afford to devote to new fields of enterprise, promising large but precarious profits. The habit of capitalist coöperation was discouraged, and settlers of the first generation seem to have been more daring investors than their successors. Colonial conditions thus fostered individualism and narrowed industrial interests, and by making capital conservative prevented its pioneering new manufactures. When these were undertaken, it was usually by recent arrivals and with imported means.

It is true that a considerable trading capital was accumulated at Boston, Newport, New York, Philadelphia, and some of the minor ports, but the possessors of this capital were interested less than any other class in America in promoting manufactures, except of the cruder kind. After the act of Parliament, in 1642, granting freedom from customs and other duties to New England vessels, a number of wealthy English merchants established themselves in the colonies. As early as 1643 a Boston trader could survive the loss of $7,000 or $8,000 in a single bad venture.[2] Less than forty years later a British official mentions about thirty Massachusetts merchants worth between $50,000 and $100,000, though a generation earlier an estate of $22,000 was thought a large one for the colony.[3] Some time before this latter date there were supposed to be fifteen merchants in New England whose aggregate property would amount to $250,000, and 500 persons worth each $15,000.[4] About the same time, in New York, a merchant with $5,000, or a planter with half that amount, was accounted a substantial representative of his class.[5] But there must have been considerably larger estates in that city. As early as 1674 the property of 62 persons living at Albany was rated in the aggregate at over $208,000, comprising one estate of $32,000, two of $20,000, and seven others of $5,000 or more.[6]

Individual accumulations of capital were much larger in the eighteenth than in the preceding century. Thomas Amory, a Boston mer-

[2] Weeden, *Economic and Social History of New England*, I, 146.

[3] Randolph, "Present State of New England," in British Museum, *Additional Manuscripts*, 28089, in *British Transcript*, Library of Congress, 3; Dorchester Antiquarian and Historical Society Committee, *History of the Town of Dorchester*, 57.

[4] Massachusetts Historical Society, *Collections*, Ser. I, vol. IV, 217.

[5] Governor Andros, "Answers to Enquiries about New York," 1678, in O'Callaghan, *Documentary History of New York*, I, 61.

[6] O'Callaghan, *Documents Relative to the Colonial History of New York*, II, 699, 700.

chant who died in 1728 at the age of 45, left property in the Azores, Carolina, and New England probably exceeding $100,000.[7] A few years later Peter Faneuil, in the same city, carried individual accounts of more than £10,000 and, probably on account of the depreciated colonial currency and the erratic financial operations of the local government, held large investments in London. In 1737 he had about $70,000 in stock of the Bank of England, nearly $5,000 in exchequer annuities,[8] and investments in East India Company bonds. The following year he had over $30,000 in Old South Sea annuities. Pennsylvania, which was favored with a better balanced economic life than the other colonies, rapidly accumulated capital, in addition to the considerable investments of Penn and his fellow Quakers. Philadelphia money supported several iron works and other manufactures in the surrounding country and sought employment in similar undertakings as far south as Virginia and the Carolinas.[9] The pioneer glass manufacturer of New Jersey accumulated a fortune at that business estimated at between $90,000 and $130,000.[10] By the end of the seventeenth century considerable estates had been acquired in Virginia and the neighboring colonies, affording some surplus for investment outside of planting. The first furnaces in Virginia were financed partly with this capital. During the Revolution a South Carolina planter and patriot died, leaving property valued at over $800,000.[11] But such accumulations, especially in the South, did not represent much mobile capital that could be employed in new activities. Often the wealthy man, in proportion to his means, contributed less to the incipient manufacturing enterprises of his vicinity than the small tradesman or mechanic, who judged more intelligently the prospects of profit which these afforded. Those who, like Franklin, acquired their fortune by manufacturing were the best supporters of sound undertakings and at the same time the surest critics of unpromising projects.

Therefore the most pretentious, if not the most successful, manufacturing concerns in the colonies were financed with British and European money. This capital was invested either directly, through actual purchases of property and its development, or indirectly through mercantile credits. The early iron works in Virginia were, of course, an outright British enterprise. The Lynn iron works were started by a company including Englishmen and colonials, though promoted by the younger Winthrop.[12] The Principio Company, in Maryland, was

[7] Weeden, *Economic and Social History of New England*, II, 571.

[8] Weeden, *Economic and Social History of New England*, II, 617, 618, 619. No New York merchants at this time carried accounts in England; Lieut.-Governor Clarke to the Lords of Trade, June 2, 1738, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VI, 117.

[9] *Cf.* advertisement, *Pennsylvania Gazette*, May 23, 1765, in New Jersey, *Archives*, XXIV, 535.

[10] Governor Belcher to Colonel Alvord, Aug. 24, 1752, in New Jersey, *Archives*, VIII, 109.

[11] McCrady, *History of South Carolina under the Royal Government*, 404.

[12] Winthrop, *History of New England*, II, 261; Corning, *The First Iron Works in America*, 2.

organized by British iron-masters who at first owned the entire stock, though later their manager, residing in the colonies, was given a share, and the Washingtons and possibly other Virginia and Maryland families became interested in the enterprise.[13] Baron Stiegel's iron and glass works in Pennsylvania were financed, at least in part, with capital which he brought from Germany;[14] and the really imposing, though short-lived undertakings of Hasenclever, in New York and New Jersey, were backed by foreign investors.[15]

After the pioneer days of colonial trade lumbering and ship-building were conducted partly with British capital advanced in the form of goods or of mercantile credits. In the seventeenth century ships and lumber ordered in America on account of English merchants sometimes were not paid for until delivered at a British port; but by 1722 it was thought good policy to send over in advance the goods required to purchase timber and build vessels.[16] Forty years later young Englishmen were still bringing to the colonies cargoes of merchandise, which they sold, and with the proceeds built ships and loaded them with lumber, provisions, and other colonial produce; these they then carried to some South European port, where they found purchasers for vessel and contents, and returning to England, embarked their money upon another venture to America.[17]

PROFITS AND INTEREST

Capital in the colonies was more ready to engage in enterprises that combined a mercantile with a manufacturing profit than in those which afforded only the latter. Even undertakings primarily industrial nearly always engaged in trading. The profits of commerce were nominally very high, partly because they were subject to more risk than at present, and because the turn-over of investments in merchandise, on account of long credits and slow transportation, required much time. Interest rates were not excessive and seem to have been steadier than rates of profits, which fluctuated widely at different places and periods. About the middle of the seventeenth century English remittances to support missionaries to the Indians, which were made in British merchandise, were considered well sold when they returned a profit of one-third on the first cost.[18] About 1685 English serge exchanged in Connecticut for a price that returned over 100 per cent net

[13] *Pennsylvania Magazine of History*, XI, 63; *Principio Papers*, in British Museum, *Additional Manuscripts*, 29600, *ff.* 9, 20, 22.
[14] Lancaster Historical Society, *Publications*, I, 45, 46.
[15] *The Case of Peter Hasenclever*, 17; Homes, *Notice of Peter Hasenclever*.
[16] Weeden, *Economic and Social History of New England*, II 553, 554, quoting Amory, *Manuscript Letter Book*, Oct. 6, 1722.
[17] Gee, *Trade and Navigation of Great Britain*, 114.
[18] Hazard, *Historical Collections*, II, 355, 356.

upon the cost in London,[19] and ten years later the Winthrop correspondence shows that, though the "hazard was not great," British merchandise in New England gave a profit of 120 to 130 per cent.[20] The governor of New York wrote, in 1699, that the average profit on imported goods was 70 per cent at Boston and 90 per cent at New York.[21] The following year stockings sold in New York for nearly five times their cost in England. During the seventeenth century English goods usually seem to have been somewhat cheaper, relatively, in Virginia than the profits just mentioned would indicate;[22] but as the planting colonies received a portion of these supplies from their northern neighbors, this could not have been a normal condition. In 1712 Virginia planters were paying more than double the home price for British manufactures.[23] Six years earlier English woolens sold at 200 per cent advance in New York, and 100 per cent advance was considered cheap in that city in 1715.[24] The introduction of paper money raised the cost of imported goods, because merchants discounted liberally its probable depreciation before their debts were collected. In 1720 English merchandise in Massachusetts brought 700 per cent over prime cost, and in 1725 articles not of a perishable nature commanded 250 per cent advance on British prices.[25] Doubtless the earlier figure includes exchange, at the current valuation of the colonial paper shilling, making the profit in sterling about 250 per cent, as it was five years later. In spite of these allowances British creditors lost large sums throughout the paper money provinces by the depreciation of the currency.

In 1775 the Congress of Deputies at Annapolis resolved that no merchant ought to sell his goods wholesale for more than 112.5 per cent advance on the prime cost, nor at retail for more than 130 per cent if paid at the time of purchase, or 150 per cent if upon credit.[26] The comparisons are between wholesale prices in Great Britain and seaport retail prices in the colonies, and probably indicate a gross profit rather than the net profit of the American retailer. At the time of the agitation by British merchants for the repeal of the Stamp Act, a Leeds manufacturer estimated that certain goods shipped from north England to America via London incurred a charge of 32 per cent for land-carriage, insurance, and commission, not including ocean

[19] Connecticut, *Public Records*, III, 185 (note), Oct. 1685; *cf.* Whitehead, *East Jersey* (2d ed. 1875), 249, 441.

[20] Wait Winthrop to John Winthrop, Oct. 28, 1695, in Massachusetts Historical Society, *Collections*, Ser. V, vol. VIII, 510.

[21] Earl of Bellomont to Lords of Trade, April 17, 1699, in O'Callaghan, *Documents Relative to the Colonial History of New York*, IV, 506.

[22] Virginia, *Statutes at Large*, I, 491.

[23] Spottswood, *Letters*, I, 179 (note), July 26, 1712.

[24] Bishop, *History of American Manufactures*, I, 330; Governor Hunter to the Lords of Trade, Nov. 12, 1715, in O'Callaghan, *Documents Relative to the Colonial History of New York*, V, 414.

[25] Weeden, *Economic and Social History of New England*, II, 480, 574.

[26] Bishop, *History of American Manufactures*, I, 381.

freight, before reaching the American distributor.[27] Colonial factors handled produce for export, and probably imported merchandise, for a commission of 5 per cent.[28] Evidently the high rate of commercial profit gave American manufacturers some protection, though an unstable one, discounted always by long credits and by retailers' profits on the articles sold through agents. But this profit was rather indicative of the absence of domestic manufactures, and when they began to be established, as in 1771, the price of imports fell to compete with them—not so much through deliberate policy of British exporters and manufacturers as through the fact that the rise of such industries indicated a demand toward which the surplus products of other countries flowed.

We may pause here to consider an actual though ambiguous account of the comparative cost of importing and of manufacturing in Virginia a variety of cloths usually required for the commoner service of a southern plantation. The following is from the records of George Washington's spinning-house at Mount Vernon, in 1767–1768.

A comparison drawn, between Manufacturing & Importing; the Goods on the other side, viz:[29]

To 509 yds. of best Cotton [sic], to supply ye place of 365 yds. wool and 144 yds. Linsey @ 1 s. 6 d.	38.03. 6.	Wool to make 365 yds. and 144 yds. of woolen cloth, viz. 499 lbs. @ 1 s. 3 d.	32. 5. 0.
To 773 yds. best Ozbs. as on ye other side @ 8 d.	25.15. 0.	Hemp to make ye contra cloth, 800 lbs. @ 4 d.	13. 6. 6.
To 40 yds. Huck @ 2 s.	4. 0. 0.	Weaving the above cloth, that is 509 yds. woolen, 773 yds. Oznbs. Cotton, &c.	30.15.10.
To 13 yds. Diapr. @ 3 s.	1.19. 0.		
To 7 yds. Jeans @ 5 s.	1.15. 0.		
To 33 yds. Cotton @ 2 s.	3. 6. 0.		
	74.18. 6.		76.15. 4.
Charges 12½ p. ct.	9. 7. 4.		
	84. 5.10.		
25 p. ct. difft. exch:	21. 1. 5.	Balance	28.19.11.
Currency	105. 7. 3.		105. 7. 3.

NOTE. By this acct. it appears that the above Balance of Lds. 28.19.11 is all that is to defray the expence of spinning hire of one white Woman, & 5 Negro Girls—Clothing—Victualling — Wheels &c.

My own work Lds	30.15.10
For sundries	23. 7.6
Total amt. of Weaving is	54. 3.4

[27] Testimony of Emanuel Ealand, British Museum, *Additional Manuscripts*, 33030, in *British Transcripts*, Library of Congress, 17, *f.* 88–206.

[28] See preceding reference. About 1766, some Philadelphia merchants reduced import commission to 2.5 per cent: Smith & Son, *Manuscript Mercantile Letters*, Philadelphia, 1765–1770, to Jackson and Broomfield, Sept. 8, 1766; *id.*, to Samuel Starbuck and Company, Mar. 20, 1769; *cf.* Woolsey and Salmon *Manuscript Letter Book*, June 25, 1778, to John Pringle; also Smith and Company, *Manuscript Letter Book*, to William Roach, Mar. 20, 1776.

[29] *An Account of the Weaving Done by Thomas Davis*, 1768–1771, in *Washington Papers*, Library of Congress, *cf.* Appendix VII.

The first column gives the cost of imported goods, equivalent to the homespuns in the second column. With the import cost are included unspecified "charges" of 12.5 per cent, probably to cover cost of importation. As the British prices are in sterling, 25 per cent is added to reduce their total to Virginia currency. Apparently Washington, who personally drew up this statement, valued his servants' work weaving 1,282 yards of woolen and linen at an average of 8 cents a yard, which is a rather low price for such labor in Virginia and may even include pay for superintending purchases and spinning. Though the conclusion of the account is not clear, the item "sundries," which amounts to over 4 pence per pound of fiber, possibly covers the pay of the white spinner and maintenance of the negro spinning-girls.

Writing in 1789 of the prospects of establishing manufactures in the newly independent States, an American remarked: "In this country, where the value of money is high, it is almost impossible any profit should be a compensation for having so large sums out as must be put into expensive projects."[30] This presumably means that money invested in America was expected to yield very large returns, and if so we should naturally expect rates of interest to be high. The data available do not allow us to judge finally of the latter point, but they suggest that these rates did not exceed those prevailing at a later period, when factory industries were already thriving in America. Eight per cent was legal interest in New England until about 1693, when the rate was lowered to 6 per cent, the colonial laws following, in this respect, the precedent of those of England, where a similar reduction had been made a few years previously.[31] That the law did not differ widely from commercial practice is suggested by a known rate of 6 per cent as early as 1659. It was 1767 before Rhode Island reduced the legal rate to that amount.[32] In 1705 the capital value of a group of mills in Pennsylvania was estimated on a basis of 8 per cent net income return.[33] In 1721 Boston rents indicated a net revenue of about 6 per cent; and in 1732 an estate in New England was offered for sale at a price affording 8 per cent income.[34] Pennsylvania loaned its paper money, on triple security, at 5 per cent interest.[35] The Carroll accounts in Maryland contain interest entries at 6 per cent.[36] However, normal returns

[30] *American Museum*, VIII, 74.

[31] Macpherson, *Annals of Commerce*, II, 479; Massachusetts, *Records of the Governor and Company*, III, 226; Felt, *Ipswich*, 103.

[32] Rhode Island, *Acts and Resolves*, June, 1767, 2d sess., 25. New York did not reduce legal interest to 6 per cent until 1738; Lieutenant-Governor Clarke to Lords of Trade, June 2, 1738, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VI, 117.

[33] Samuel Carpenter to Jonathan Dickenson, 1705, in Pennsylvania Historical Society, *Memoirs*, IX, 233, 234.

[34] Weeden, *Economic and Social History of New England*, II, 532. House rent was about the same in Maryland in 1769; Martin Cockburn, *Manuscript Account Books*, I, entry Nov. 5, 1769.

[35] *Cf.* Governor Burnet to Lords of Trade, May 12, 1724, in New Jersey, *Archives*, Ser. I, vol. V, 91.

[36] Carroll, *Manuscript Account Book, e. g.*, 34, Sept. 29, 1750.

from investments, even the most conservative, must have been higher than these rates would indicate.[37] About 1750 lands in the colonies were valued at seven years' income, as compared with twenty or thirty years in Great Britain, indicating an average return from agricultural capital three times as great as in the mother country.[38] In 1762, in Rhode Island, rents were considered one-twelfth the purchase price in rating taxes; and in 1767, in the same colony, rents were rated at twenty years' purchase for lands and fifteen years for houses and distilleries. A minority protested that this was too high for lands and too low for houses.[39] Shortly after the Revolution the profit of agriculture in Rhode Island was estimated at only 3 per cent, a condition which helps to explain the early diversion of capital to manufactures in that State.

MANUFACTURING CAPITAL

In colonial times relatively less manufacturing capital than at present was required for fixed investments, such as buildings and machinery, and relatively more for operation. The necessity for a large operating capital was due to the slow processes of manufacture and to delayed returns from sales on account of tardy transportation and long credits. Although commercial credit was already an important instrument of exchange, lack of banking facilities limited its benefits. Therefore, even in large and distant transactions, an actual barter of commodities occurred, like that in neighborhood trade, so that several transfers of property might be necessary before a manufacturer had exchanged his products for the articles he required in return, and consequently a large part of his capital always was suspended in commerce. Though the savings of an industrious mechanic might suffice to equip a workshop that would be at no serious disadvantage in competition with the larger works of a wealthy rival, he was not able to compete with the latter as a merchant or to extend his market to points of greatest profit. This condition applied especially to handicraft trades, which, partly for lack of capital, never were carried much beyond the point of neighborhood production. Where labor-saving machinery and water-power could be applied to manufactures, as in case of mills, the modest resources of the pioneers were sufficient to give industries a start, after which they created their own capital, until by the close of the colonial period really important enterprises of this character had been established without other aid than their own profits. A third class of manufactures required what was for the time a large initial outlay, and these especially felt the lack of free capital in the colonies, and their success was in most cases conditioned by financial

[37] Commercial and public interest was often 8 and 10 per cent; *e. g.*, O'Callaghan, *Documents Relative to the Colonial History of New York*, IV, 13, 134, 136, 140; V, 738; VI, 116; VIII, 169; *cf.* Hamilton, *Itinerarium*, 131.

[38] Douglass, *British Settlements in North America*, II, 178.

[39] Rhode Island, *Acts and Resolves*, Feb., 1762, 80; *id.*, June, 1767, 25; *cf.* Weeden, *Early Rhode Island*, 330.

assistance from abroad. About 1670 the glass works at Salem were stopped "for lack of capital."[40] An account of Virginia, published in 1688, explains the absence of iron works by their requiring "a greater fund and bank of money to carry them on than any there are able to lay out"; and in 1712 the lieutenant-governor of New York gave the same reason for the neglect of this industry in that colony.[41] The frequent subsidies to manufactures in New England, and later in Pennsylvania, were public efforts to supply this lack of capital, and the failure of several promising enterprises during this period was due as much to want of financial resources as to any other condition peculiar to the colonies. Ultimately, as we shall find, it was wealth accumulated through commerce that laid the foundations of American industry in a larger sense. The rising private fortunes and the lowering return from customary investments during the half century preceding the Revolution were preliminary to the financial conditions that made more extensive manufactures possible; but they did not, during that period, attain a position fully to achieve this result.

SCARCITY OF LABOR

Shortly before the Revolution Benjamin Franklin, who was perhaps as nearly a "captain of industry" as any colonial, wrote:

> "Manufactures, where they are in perfection, are carried on by a multiplicity of hands, each of which is expert only in his own part, no one of them a master of the whole; and if by any means spirited away to a foreign country, he is lost without his fellows. Then it is a matter of extremest difficulty to persuade a complete set of workmen, skilled in all parts of a manufactory, to leave their country together and settle in a foreign land. Some of the idle and drunken may be enticed away, but these only disappoint their employers, and serve to discourage the undertaking. If by royal munificence, and an expense that the profits of the trade alone would not bear, a complete set of good and skilful hands are collected and carried over, they find so much of the system imperfect, so many things wanting to carry on the trade to advantage, so many difficulties to overcome, and the knot of hands so easily broken by death, dissatisfaction, and desertion, that they and their employers are discouraged together, and the project vanishes into smoke."[42]

In these words Franklin was but reciting the history of the more important colonial attempts to establish a new industry or to enlarge an old one with which he was personally familiar.[43] At a time when

[40] Essex Institute, *Historical Collections*, XVI, 3.

[41] Clayton, "Account of Virginia," in *Force, Tracts*, III, 12, p. 27: Lieut.-Governor Clarke to Lords of Trade, June 2, 1738, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VI, 116; Colden, *On the Trade of New York*, in O'Callaghan, *Documents Relative to the Colonial History of New York*, I, 488, 489.

[42] Franklin, "The Interest of Great Britain in America," 32, 33, in *Works*, IV, 61–62.

[43] Bishop, *History of American Manufactures*, I, 204, 208, 336; Governor Moore to Lords of Trade, Jan. 12, 1767, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VII, 888; Deputy Governor Penn to Lords of Trade, Jan. 21, 1767, in British Museum, *King's Manuscripts*, 205, *British Transcripts*, Library of Congress, 23; Lieut.-Governor Colden to Lords of Trade, Mar. 9, 1764, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VII, 612; Colden, *On the Trade of New York, id.*, I, 485, 489.

individual skill was so much more important than machinery in manufacturing, there was greater difficulty in acclimating new arts than there is at present; for the workman, being more adaptable than a machine, was often influenced, after he had immigrated, to turn his attention and labor to other fields.

Scarcity of labor was as common a complaint as scarcity of money, and presented two phases—a lack of labor in general and default of the particular kind of skill required to forward some new enterprise. The immigrants that came to America from Great Britain appear to have been more largely farmers and laborers than skilled craftsmen; for to these a new country offered chief inducements. The early migrations to New England were contemporaneous with the disappearance in the mother country of the yeomanry as a well-defined social class, though they were not the cause of this; and until the later period of colonial settlement England was not a manufacturing nation. Merchants, professional men, and seafarers came to the colonies to build up the port population, and with them such mechanics as served the immediate needs of the new towns; but the last were not in sufficient numbers to form an operative class. In the South, after the very early importation of skilled Europeans to make tar, glass, and potash, and of iron workers for the ill-fated furnace on the James, the regular course of immigration supplied few of the thrifty artisan class, and those who came in charge of recruiters as indentured servants must have been generally the less favored of their craft and were absorbed by the market for agricultural labor. Sometimes a Virginia planter would order from England shoemakers or coopers to do his plantation work, but these bound servants were subordinate to the dominant industry and did not found independent manufactures.[44]

Five definite migrations of skilled workers to New England founded or revived industries in that group of colonies. About the date of settlement some of the ablest shipwrights of England removed to Massachusetts, and as they transmitted their craft to worthy descendants this art was as well maintained in America as in the mother country.[45] Winthrop brought over skilled iron workers to Lynn, and from this stock sprang the founders of this industry throughout New England and New Jersey.[46] German Protestants established manufactures at Quincy.[47] With the Rowley settlers, in the seventeenth century, was imported the skill of the Yorkshire woolen manufactures, and textile arts were raised to a higher standard,[48] while in the following century

[44] Bruce, *Economic History of Virginia in the 17th Century*, II, 478; *cf.* James Forrests proposal in *Linen Manufacturing Papers*, Boston, 1768.

[45] Great Britain, *Calendar of State Papers, America and West Indies*, 1574–1660, 158.

[46] Swank, *Iron in All Ages*, 112, *et seq.*

[47] Weeden, *Economic and Social History of New England*, II, 686.

[48] Mavericke, "Brief Description of New England," in British Museum, *Edgerton Manuscripts*, 2395, *f.* 400, printed in *New England Historical and Genealogical Register*, XXXIX, 33–48; Johnson, *Wonder-working Providence*, 183.

the flax-workers from North Ireland, who, founded Londonderry and its linen industry near the Merrimack, not only brought with them the secrets and improved implements of their craft, but helped to occasion an industrial revival in the northern provinces.[49]

Meanwhile, for want of skilled workers, other industries languished or failed. The ill success of the New Hampshire iron works, in the early eighteenth century, was ascribed to want of qualified hands; and the same reason was given for the slow development of iron-making in Maryland.[50] Artisans from Germany, Holland, and other parts of Europe contributed more in proportion to their numbers than did the English-speaking settlers to the progress of new industries. Speaking of the population of Pennsylvania before the Revolution, a contemporary wrote that three classes of people emigrated there: the Irish, who brought few of the arts; the English, who brought more; and the Germans, who brought most.[51] Spottswood's Virginia furnaces were operated with German labor; the same people built up the iron and glass manufactures of Pennsylvania and the potteries of that province and its neighbors; while from Amsterdam came the first paper-makers of the colonies.[52] Two manufacturing towns, one in Pennsylvania and the other in Massachusetts, were named Germantown, and both became the seats of textile industries of some importance, while the latter, though with less success, manufactured glass and attempted further enterprises.[53] The incipient silk industry of Georgia also was carried forward by German immigrants.[54] An artisan from Portugal began the manufacture of castile soap in Rhode Island.[55] Before the Revolution English potters settled in South Carolina, but made little progress with their industry; and at the close of the war American agents appeared in Birmingham and elsewhere throughout the English manufacturing districts, secretly inducing skilled workers to migrate to the new Republic across the sea. For many decades after this America continued dependent upon foreign workmen for the introduction of new arts and the maintenance of old ones.[56]

Therefore during the colonial period industrial progress constantly was halted by lack of competent craftsmen, for whose training there

[49] Bagnall, *Textile Industries*, 16, 17, 18. Irish settlers also established this industry in Somerset County, Maryland, and in South Carolina; *cf.* Sir William Keith to Lords of Trade, Nov. 29, 1728, in New Jersey, *Archives*, v, 204.

[50] Belknap, *New Hampshire*, II, 29.

[51] McLane, *Report on Manufactures*, II, 837.

[52] *Virginia Magazine of History*, VI, 385; Spottswood, *Letters*, II, 196. Stiegel and Hasenclever were Germans; *Pennsylvania Magazine of History and Biography*, IX, 344, 345; Pennsylvania German Historical Society, *Proceedings*, IX, 218, 417; Lancaster, Historical Society, *Publications*, I, 327.

[53] Letter of Pastorius, Mar. 7, 1684, in Pennsylvania German Historical Society, *Proceedings*, IX, 140.

[54] Jones, *History of Georgia*, I, 373–374.

[55] Rhode Island, *Acts and Resolves*, Feb. 1761.

See 399–401*f.*

was no opportunity in a recently settled country. For this reason apprenticeship rules were relaxed, half-qualified workers undertook responsible commissions, and workmanship often deteriorated. Time and money were wasted in fruitless experiment to learn what was known already in older lands. But at the same time American workers acquired initiative and resourcefulness which, combined with a knack for adapting means to ends, fostered invention and mechanical improvements.

The attractions of independent life as a land-owner drew skilled immigrants away from their traditional occupations to agriculture,[57] and for this pursuit a community preference grew up which was supported not only by habit but by social prejudice. Manufacturing came to be associated in the eyes of the colonists with poverty; and the use of pauper labor in British factories fixed this stigma so strongly upon some industries that it outlasted the first generation of the Republic. In the coastal districts of the South slavery had begun to create a race line in occupations, of which we have scant but significant records,[58] and reënforced the natural tendency of the colonists to seek independent employments. Therefore, even where they were equally remunerative, it was more difficult in America than in England to divert men from farming to industrial pursuits.

COMPARATIVE WAGES IN AMERICA AND EUROPE

The scarcity of labor, and its productiveness in a new country, made wages in the colonies higher than in Great Britain and Europe. This general fact is supported without exception by contemporary testimony, and in general, though less explicitly, by wage statistics. The superior well-being of common laborers in New England was a matter of congratulation with the first generation of settlers.[59] In Virginia, during the seventeenth century, skilled labor was at times very dear; and the tobacco wage of common hands was in 1623 equivalent to about $1.25.[60] However, we are told by a recent writer that in 1680 farm servants in Virginia were paid about the same rate as those doing similar work in England.[61] In 1695 it was reported that wages in New

[57] *Cf.* Bruce, *Economic History of Virginia in the 17th Century*, II, 405; Virginia Historical Society, *Collections*, II, 27; Governor Wentworth to the Earl of Melbourne, Mar. 25, 1768, in British Museum, *King's Manuscripts*, 205, *British Transcripts*, Library of Congress, 23; Governor Moore to Lords of Trade, Jan. 12, 1767, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VII, 888, 889; Act 5, George II, Chap. XXII, § 8.

[58] *E. g.*, "All ye arguments yt could be used could not prevail on ye Gloucestershire men to admit a clause to teach negroes." Letter of William Russell to William Chetwynd, April 17, 1725, *re* Principio workmen engaged in England, *Principio Papers*, in British Museum, *Additional Manuscripts*, 29600, *f.* 3; *cf.* also House of Commons, *Journal*, 1737, XXIII, 116; advertisement of John Matthews in *South Carolina and American General Gazette*, Mar. 4, 11, 1768; notice in same Nov. 6, 9, 1793.

[59] "New England Plantations," in *Force, Tracts*, I, 12, p. 11; Coffin, *Newbury*, 367.

[60] Bruce, *Economic History of Virginia in the 17th Century*, II, 415.

[61] Bruce, *Economic History of Virginia in the 17th Century*, II, 49.

England were six times as high as in Sweden.[62] An earlier writer, describing the Lynn iron works in 1651, commented on the high price of labor, "which ordinarily was as much more as in England, and in many things treble."[63] The first historian of Pennsylvania, writing in 1698, said that in that province men and women would receive "near three times more wages" than in either England or Wales.[64] About fifty years later a pamphleteer estimated that colonial wages were 70 or 80 per cent higher than those in Great Britain.[65] In 1773 Adam Smith described the wages of laborers and artisans as much higher in New York than in London, though provisions were cheaper than in England.[66] However, wages were usually higher in New York than in New England, and in the proprietary than in the charter colonies. Paper money inflation depressed real wages or prevented normal advances in several colonies. Out of some fifty quotations of laborers' wages between 1630 and 1775, practically none falls below 25 cents and few exceed 50 cents a day without board. The normal summer wage was probably about 35 or 40 cents. During the same period corresponding labor in England received from 25 to 30 cents a day, the pay of town workers sometimes rising to 40 cents. Colonial wage statistics relating to artisans' earnings are misleading, because the same person, especially in New England, was accounted a carpenter, mason, or common hand, according to the particular work he chanced to be doing; and in such cases the temporary occupation did not influence the rate of pay. But our figures indicate that skilled artisans following a single trade earned from 60 cents to $1.25 a day, the normal wage apparently rising during the eighteenth century. The pay of employees of this class was probably one-fourth higher in the colonies than in towns of corresponding size in England.[67]

It is more difficult to ascertain what margin of advantage lower wages gave the mother country in industrial competition with her colonies, because we have almost no comparable statistics of rates of pay in operative occupations. Hand sawyers in New England, about 1640, received $1.25 a hundred, and towards the close of the century their pay was about a dollar in Pennsylvania. Between these two dates we have a reported English rate of 60 cents for the same labor.[68] For colonial spinning and weaving prices we have reasonably abundant data, but applying only to home work. Flax and cotton yarns were spun for 20 or 30 cents a pound, and worsted and woolen

[62] Letter of John Taylor, July 2, 1695, in British Museum, *Additional Manuscripts*, 10120, *ff.* 77–78.

[63] Johnson, *Wonder-working Providence*, 246.

[64] Thomas, *History of Pennsylvania*, 9.

[65] *State of the British and French Colonies in North America*, 142.

[66] Smith, *Wealth of Nations*, B. I, Chap. 8.

[67] South Carolina, *Laws*, 1740–1742, 52; Rogers, *Work and Wages*, 404; Davidson, *Annals of Toil*, 201; Massachusetts Historical Society, *Proceedings*, Ser. II, vol. I, 148–149, Apr., 1884.

[68] Weeden, *Economic and Social History of New England*, II, 879; Thomas, *History of Pennsylvania*, 29; Young, *Labor in Europe and America*, 153.

yarns for a few cents a pound more.[69] In New England, about the time of the Revolution, country women wove tow cloth and checks for 5 cents a yard, and the price for weaving more expensive woolens, such as serge and kerseys, ranged up to 15, and in some instances 18 cents a yard.[70]

Virginia plantation accounts of work given out to white spinners and weavers between 1768 and 1770 contain items of 10.5 cents a pound for spinning woolen yarn, and from 5.5 cents to 25 cents a yard for weaving linen and country cloth.[71] George Washington's weaver, as we have seen, was credited with 8 cents a yard for his services. A good spinner could spin about a pound of yarn and a weaver could weave 6 to 8 yards of coarse cloth a day, so that the earnings of workers of this class ranged from 10 to 30 cents a day for spinning and from 30 cents to over a dollar a day for weaving.[72] At Danvers, Massachusetts, women employed to pull flax received 17 cents a day, while men's labor in breaking or swingling flax commanded double that sum.[73] In Philadelphia, soon after the Revolution, male weavers earned about 63 cents a day.[74]

In 1775 Adam Smith, writing of Scotland, stated that it was a good spinner, working under conditions not unlike those in New England, in that this was a household employment, who could earn 40 cents a week.[75] In Ulster, about the same date, women spinners were paid 7 cents a day and fine weavers earned only $2 a week.[76] In 1768 Arthur Young reported the average wage of women employed in the textile trades of England as about $1 a week, and those of men from $1.75 to $2.50.[77] At a moderate estimate, then, wages in these industries were 50 per cent higher in the colonies than in Great Britain. In 1728 the British authorities estimated that high wages made it cost 20 per cent more to manufacture linen, and 50 per cent more to manufacture woolen, in America than in England.[78] It is not unlikely that the operatives of the latter country, in addition to making finer goods, on account of superior skill and greater division of labor produced more than those of the colonies. This condition, combined with lower wages, probably reduced the labor-cost of manufacturing in England to about one-half what it was in America. Moreover, before power machinery supplanted handicrafts wages were a larger fraction of the total cost of

[69] Thomas, *History of Pennsylvania*, 29, 36; David Tilton, *Manuscript Account Book*, 1722; Holten, *Manuscript Account Book*, Nov. 4, 1768; Obediah Brown, *Manuscript Account Book*, June 8, 1773.

[70] Holten, *Manuscript Account Book.*

[71] Martin Cockburn, *Manuscript Account Book.*

[72] Temple, *History of Whately*, 71; *American Museum*, v, 225.

[73] Holten, *Manuscript Account Book*, Feb. 18, 1760, Aug. 4, 1770.

[74] *American Museum*, v, 225

[75] Smith, *Wealth of Nations*, Bk. I, Chap. 10.

[76] Bowley, *Wages in the United Kingdom*, 53.

[77] Young, *Labor in Europe and America*, 159.

[78] *Report of the Board of Trade, Dec. 5, 1728*, in New Jersey, *Archives*, v, 208, 209; *Linen Manufacturing Papers, Boston, 1768, sheet* 92.

manufactured articles than at present. Foreign observers thought that the colonies would never be able to surmount this obstacle to industrial development, which was caused partly by irregularity of employment due to the seasonal character of many occupations, and assumed that they consequently would remain solely producers of raw materials for Europe.[79] The colonists themselves accepted this situation in theory, but repeatedly rebelled against it in practice. In the final event their instinct proved wiser than their reason, but this was to be shown only by repeated trials and failures, and until after the close of the colonial period the relatively high cost of labor was the most marked symptom of the complex of economic conditions that discouraged manufactures in America.

[79] Mitchell, *Present State of Great Britain and North America*, note to 297–301; *American Museum*, v, 584; *cf.* also Busching, *Entwickelung der handelspolitischen Beziebungen zwischen England und seinen Kolonien*, 72; Schoepf, *Travels in the Confederation*, I, 117–120.

CHAPTER VIII

TECHNOLOGY AND ORGANIZATION OF COLONIAL MANUFACTURES

Plant and processes of household manufactures, 159. Workshop crafts, 161. Mill and furnace industries, 164. Industrial organization, 181. Manufacturing companies and associations, 182. Beginning of industrial towns, 185. Origin of the factory system in America, 188.

PLANT AND PROCESSES OF HOUSEHOLD MANUFACTURES

An industrial plant includes all the physical means combined in a single establishment by which raw materials are converted into manufactured goods, and processes are the succession of operations by which this result is achieved. The former word is now more significant than it was before the improvement of machinery, but it applied as exactly to the assemblage of simple implements around a colonial fireside as to the complex equipment of a Lowell factory. Machinery, markets, and capital all helped to determine the organization of colonial manufactures, but machinery had the most concrete and immediate effect. It would hardly repay the labor to analyze the remoter ramifications of this influence, but the technology and the organization of manufactures are so far mutually explanatory as to justify their being treated in association.

The homespun and household manufactures of colonial America were not specialized, and it is this fact chiefly that distinguishes them from workshop crafts, which not infrequently were likewise followed at the home of the operative. Intended for the most part to supply only family needs, these manufactures did not employ the entire time and attention of any one person, nor were they continuously pursued by the family collectively; therefore they were necessarily confined to those arts that did not require expensive tools or special skill. Hemp and flax were broken and the fiber prepared for hatcheling or carding by manual operations, requiring machinery little more complicated than the flail with which grain was threshed; and indeed these two processes were similar in that they both represented in farm economy the final act of harvesting. In the South, when cotton was not picked over by hand it was cleaned with a bow and was ginned with a roller contrivance of home construction. Manufacturing in a more appropriate sense began with combing or carding the fibers, which was done by hand with implements no more complicated than a wire hairbrush. Slightly different cards were used for wool and cotton, and wool comb-

ing sometimes was plied as a separate trade. The character of colonial wool and flax, which latter was allowed to ripen for its seed, the high cost of labor, and lack of care and skill in handling fibers, made fabrics of carded tow, cotton, and wool relatively common as compared with long-stapled, combed linens and worsteds.

The distaff and spindle, or "rock," was at one time not unknown in Massachusetts and among the German immigrants to Pennsylvania,[1] but from the earliest period the colonists commonly used the hand-wheel for spinning wool and cotton.[2] About a century later, apparently when the Londonderry settlers came to New England, the small or Saxon wheel was made known to Americans.[3] It was operated by a treadle, and the spindle contained the bobbin and flyer which later became the germ of Arkwright's invention. But this wheel, which may have been used by the Germans of New York and Pennsylvania earlier than in New England, was ordinarily employed only for flax. The larger colonial houses often had a special spinning room, and sometimes, more particularly in the South, a separate building was devoted to this purpose.[4] So long as an operative was required for every spindle, as in case of both of the wheels then in use, there was no economy in applying water-power to spinning, and we have but a single doubtful instance where this was done.[5] Neither was the spinner's labor capable of subdivision, and consequently no motive existed for assembling this manufacture in large establishments.

Weaving was a more elaborate process, requiring relatively larger mechanical equipment and greater or less usual skill, and frequently employed the labor of men; therefore it was less exclusively a household industry. Though before the beginning of the eighteenth century an improved loom had replaced the more primitive apparatus of the earlier colonists, the fly shuttle was not used in America until after the Revolution.[6] The textile implements of the household, except the cards, were made of wood and generally were the product of the village cabinet-shop or the family work-bench. Dyeing and such rude finishing as was necessary for the rougher homespuns for country use were likewise household crafts, and the indigo tub was almost as common an article of furniture as the churn. Vegetable dyes from the West Indies and the local forests afforded a variety of colors, some of which were both beautiful and stable.[7] But though these processes lingered

[1] Weeden, *Economic and Social History of New England*, I, 304; Kriebel, *The Schwenkfelders in Pennsylvania*, in Pennsylvania German Society, *Proceedings*, XIII, 51.

[2] Bishop, *History of American Manufactures*, I, 332, Note 2; Hazard, *Historical Collections*, II, 444.

[3] Pattee, *Braintree*, 64 (note).

[4] Atwater, *History of the Colony of New Haven*, 364; McCrady, *History of South Carolina in the Revolution*, 747.

[5] Advertisement of Samuel Reynolds in *Pennsylvania Gazette*, Mar. 2, 1769.

[6] Bishop, *History of American Manufactures*, I, 333, also *id.* Note 1; Rhode Island Society for the Encouragement of Domestic Industry, *Transactions*, 1864, 62; *cf.* Bentley, *Diary*, IV, 232, Feb. 3, 1814.

[7] Kalm, *Travels into North America*, I, 131, 132, 154, 189.

in the family until long after the colonies secured independence, the later operations of cloth-making tended to become specialized, and in the vicinity of towns, at a very early date, inclined toward a workshop or factory basis. At first the dominant influences favoring that result were superior skill and the use of water-power for fulling; but later these were reënforced by other mechanical improvements.

The group of manufactures now centered at packing-houses was in colonial times dispersed among the farmers, who cured and salted for market the meat they raised and made their own lard, tallow, candles, and soap. No plant besides a trying-kettle, an ash-leach, and sometimes candle-molds, was required for these operations. The other mechanic arts supplying rural homesteads were practiced by their occupants as occasion demanded. Nail-making at the kitchen fireside, which occupied the winter evenings of the eastern Massachusetts farmers, required but a simple equipment of anvil tools. Mill industries sooner overcame this household competition than did the workshop crafts, and the determining cause of such technical concentration of manufactures as occurred in the colonies was not so much division of labor and special skill as the use of water-power.

WORKSHOP CRAFTS

Under the invention of automatic spinning, power machinery was used to prepare raw materials for manufacturing rather than to produce finished goods—to saw lumber, forge iron, grind grain and bark, break hemp, rather than to perform the final operations which fitted these commodities for direct consumption. Therefore intermediate between the mill, the furnace, the tannery, and the last user of their products were the craftsmen who were the true manufacturers. Their work was done for the most part in small shops with hand tools, partly upon order of individual customers and partly for the general market. In Massachusetts and Pennsylvania several handicrafts, such as shoemaking, coopering, and ship-building, immediately expanded into active industries. The technology of these tool-using manufactures affected their organization chiefly through dependence on skilled labor. Skill had been the basis of the European craft-guilds and gave rise to a few similar organizations in America. But the small market for their wares did not allow enough colonial workers of the same trade to assemble in one place to form many such societies, while the dispersion of industry prevented those founded from controlling methods of manufacture. Several distinct processes, therefore, were performed by the same operative, who could not perfect his skill in any one of them. Thus the tanner was also, in spite of prohibitive legislation,[8] a currier and shoemaker, the weaver was a cloth-dresser and dyer, the soap-

[8] Page 66 preceding; Winsor, *Memorial History of Boston*, I, 498; *cf.*, however, Newhall, *History of Lynn*, 256.

boiler a tallow-chandler, the building mechanic a ship-carpenter, the blacksmith a toolmaker, for the same reason that a doctor was also a dentist and druggist, and a miller oftentimes a farmer and merchant.[9]

The craft societies of which we have definite record were confined mostly to New England. In 1647 we are told of the prosperity of Boston tradesmen, "especially coopers and shoemakers, who had either of them a corporation granted," with the statement that the latter were able to keep prices double what they were in England.[10] As in the mother country, the authority thus granted city artisans in Massachusetts was opposed vigorously by their country competitors. Evidence dating from more than a quarter of a century later indicates that in that colony a five years' apprenticeship for coopers was enforced effectively, suggesting that the organization previously mentioned may have been still in existence.[11] The English hatters, in petitioning Parliament to impose restrictions upon this industry in America, enumerated the same grievances that organized artisans in the mother country held against their unorganized home competitors, indicating that this manufacture in the colonies was thriving but uncontrolled.[12] Temporary associations of workingmen may have existed in the ship-building trades. Shortly before the Revolution the mechanics of Charleston, South Carolina, took a prominent part in political agitation, and divided with the merchants, in the proportion of three to two, the city's delegation to the provincial assembly;[13] but whatever organization may have existed among them probably followed class lines rather than trade divisions. At the time of the processions to celebrate the adoption of the Constitution, in Philadelphia and Boston, the manufacturing artisans of those cities seem to have been represented by societies, though these may have been formed for the occasion. But two years earlier artisan clubs, including associations of coopers, masons, ropemakers, saddlers, and watchmakers, were in existence at Philadelphia, and similar bodies were said to be active in New York and Boston.[14] Even in the larger towns many, possibly most, of the manufacturing mechanics were their own employers, and the distinction between master and journeyman was less important and likely to be less permanent than to-day.

Two influences fostered the expansion of the workshop into a manu-

[9] *Cf.* bill of a mechanic for work as a farm-hand, carpenter, saddler, shoemaker, wheelwright, and possibly as a blacksmith, in Martin Cockburn, *Manuscript Ledger and Day Book*, Apr. 23, 1772.

[10] Johnson, *Wonder-Working Providence*, III, Chap. VI, 247–248.

[11] See p. 66 preceding; also Massachusetts, *Records of the Governor and Company*, II, 249.

[12] New Jersey, *Archives*, V, 306, 307.

[13] McCrady, *History of South Carolina under the Royal Government*, 605; *cf. id.*, 742.

[14] *American Magazine*, IV, 187–188, Feb. 1788. *Cf.* Bishop, *History of American Manufactures*, I, 419; Hazard, *Register of Pennsylvania*, I, 419–424, July 5, 1828; Crèvecœur, *Voyage dans la Haute Pensylvanie*, III, 366; South Carolina, *Session Laws*, Mar. 1785, Chap. 27, incorporating a Merchant Tailors' Society, and Watkins' *Digest of Laws of the State of Georgia*, 518, 547, incorporating Savannah and Augusta Associations of Mechanics.

factory, one commercial and the other technical. The artisan who manufactured wares for sale occupied a higher industrial status than the mechanic who made goods to order, and from him in time developed the merchant manufacturer, either through the small tradesman's becoming a seller of wares beyond his own individual capacity to produce or through the merchant's becoming a manufacturer or organizer of manufactures in order to supply his custom. Thus we have records of colonial tanners who built up a trade in leather extending to other colonies;[15] and our data, though incomplete, allow us to surmise that coopers, printers, toolmakers, weavers, and other craftsmen sometimes became employing manufacturers. The estate of a Boston weaver, probated in 1696, indicated that he combed worsted and wove serge, which he probably exchanged for wool or for yarn from country homesteads. He operated four looms, a fulling mill, and two dye furnaces, and his stock in trade included several hundred pounds of dyes and of combed and carded wool, besides yarn and cloth.[16] Old account books show that merchants gave our flax, cotton, and wool to the country people to spin and weave for them, and shoe trimmings, for which they were paid in shoes; that they took in exchange for their merchandise hogs and cattle, which they slaughtered and packed for export, and that in general they formed a medium through which the household industries became centralized.[17] Upon the workshop crafts their influence was less manifest; there are few if any instances recorded during colonial times where a merchant, as a logical development of his business, employed a corps of coopers to make barrels, or of shoemakers to manufacture shoes. But merchants not infrequently contracted with shop-owning artisans for wares, with almost the same effect on shop evolution as if they had employed journeymen directly.

The main technical influence shaping the growth of shops into factories was the use of power machinery, and in the class of industries now being described this did not occur to any marked extent until after the Revolution; but with larger markets more division of labor became possible, and this favored the adoption of perfected processes.

The number of handicrafts introduced at a very early date, if we may trust to the accuracy of contemporary evidence, was rather larger than might have been anticipated. Writing of Boston in 1647, a resident of the colony mentioned as actually followed in that town six wood-working trades, seven metal-working trades, and three forms of leather manufacture, besides naming weavers and ropemakers, feltmakers and furriers, brickmakers and tilemakers, and minor indus-

[15] Connecticut, *Public Records*, 1706–1716, v, 18; also 54, preceding.

[16] *E. g.*, Suffolk *Probate Records*, XIII, 743, cited by Weeden, *Economic and Social History of New England*, I, 389; *cf.* advertisement of Widow Bayley to sell six rooms, twisting and warping mills, and several servant weavers, in *Pennsylvania Gazette*, Aug. 13, 1741.

[17] *E. g.*, S. Nightingale, *Manuscript Petty Ledger* 99; Davy and Carson, *Manuscript Letter Book*, July 29, 1748; Judd, *Hadley*, 372.

tries.[18] Fifty years later a Pennsylvania writer mentioned fifty-one manufacturing handicrafts, besides the building trades, as followed in Philadelphia.[19] In a list of persons attainted of treason by the Pennsylvania Assembly during the Revolution were eleven blacksmiths, seven tailors, six coopers, six wheelwrights, five shipwrights, five hatters, five printers, four tanners, four shoemakers, four weavers, three cordwainers, three saddlers, three joiners, two button-makers, two peruke-makers, two makers of breeches or leather breeches, two millers, besides a stocking-weaver, a fuller, a dyer, a rope-maker, a distiller, a brewer, a maltster, a snuffmaker, a tallow-chandler, a leather-cutter, a cutler, a gunsmith, a gunpowder-maker, a silversmith, an engraver, a coachmaker, a cabinetmaker, a sawmill man, and a lime-burner. The gunpowder-maker and rope-maker also bear the title of merchant.[20] Such a list as this is suggestive rather than exhaustive; on the one hand it does not nearly cover the field of usual manufacturing occupations; on the other, it was customary at that day to designate a man by his calling, whether he actually followed it or not. But a bare enumeration of the trades that we know were plied in the colonies indicates that varied and widely diffused handicraft manufactures then existed, in the aggregate contributing largely to colonial production, but chiefly important for the leaven of knowledge, skill, and habit which they supplied for subsequent industrial development.

MILL AND FURNACE INDUSTRIES

This term may be applied loosely to all forms of manufacture not carried on in the household or at the work-bench, and will include a few, such as tanning and brewing, alluded to incidentally in connection with handicrafts. One class of these industries depended for perfection upon carefully observed processes rather than upon manual skill or machinery. Among such manufactures were making pitch, tar, turpentine, and potash, brewing and distilling, dyeing and cloth printing, tanning, and salt-making. Another class included manufactures where skill was the main element, though combined with some use of power machinery, as in paper-making and cloth-finishing; or where power, processes, and skill were combined, as in iron-making. To saw lumber and grind flour, untrained labor was thought sufficient; at least the success of milling enterprises was not considered so dependent on a special class of workmen as were the other manufactures mentioned.

The early progress, distribution, and organization of these industries were governed largely by the conditions just described. Manufactures

[18] Johnson, *Wonder-working Providence*, III, Chap. VI, 248; *cf.* Dearborn, *Boston Notions*, 46–47; Coffin, *Newbury*, 368.

[19] Thomas, *History of Pennsylvania*, 32, 33, 34.

[20] Pennsylvania, *Archives*, Ser. IV, vol. III, 729.

depending upon skillfully guided processes or expert manipulation extended less rapidly and remained more strictly localized, as did paper-making in the vicinity of Philadelphia; often they required sufficient capital to carry them through an experimental stage and, therefore, first appear in relatively large and centralized undertakings, such as iron and glass works. Others, though they might employ considerable skill for the best results, used such a rude and inexpensive plant that they could be conducted experimentally by self-taught workmen.

The tar kilns of the Carolinas illustrate the latter industries. These kilns consisted of little else than a pile of corded pitch pine knots, erected on a stamped-clay floor so inclined as to drain the tar, as it was formed, into a wooden trough leading to a barrel set in the ground. The pile was covered with turf or earth, as in burning charcoal, and, except for the rude means just mentioned for collecting the tar, did not differ essentially from a charcoal-kiln. We are told that in the Carolinas 400 barrels was a good kiln, and the largest known ran 960 barrels. Most of the tar made in America was produced from dead trees. A better quality could be manufactured from boxed or partly girdled trees, and for such tar a higher premium was paid by the British Government; but scarce labor, abundant forests, indifferent skill, and other incentives to a maximum production with a minimum of toil, caused American tar to be mainly of the poorer and cheaper grade, though the quality improved in the eighteenth century.[21] New England's efforts to encourage this manufacture by local monopolies were temporary and unimportant. The only attempts to organize the industry on a large scale were made by commercial companies that proposed to control the marketing of naval stores rather than their manufacture. Several trading projects of this sort at different times sought special privileges from the British Government, though without success, and none of them ever reached the stage of operation.[22] So this industry continued dispersed, unorganized, and primitive.

Similar conditions attended the making of potash. Wood-ashes from open-air fires were collected and leached in barrels or tubs, and the lye was boiled in a battery of open kettles until the potash remained as a black residue. To make pearl ash this residue was exposed to the heat of a hot fire, in an oven or a reverberatory furnace of simple construction, until the carbon was burned out, leaving a lighter-colored and more valuable substance;[23] but this more carefully prepared

[21] *Massachusetts Magazine*, III, 213, 214, Apr, 1791; Douglass, *British Settlements in North America*, II, 62, 63, 64; Byrd, "Progress to the Mines, 366, also "Dividing Line," 85 in *Writings;* Representations of the Lords of Trade concerning New York, in O'Callaghan, *Documents Relative to the Colonial History of New York*, IV, 705.

[22] Lord, *Industrial Experiments in the British Colonies*, 15–41.

[23] La Rochefaucault, *Travels through North America*, I, 386.

product was comparatively rare in the colonies. In Massachusetts an attempt was made to establish a large potash factory, with four furnaces, designed to evaporate instantaneously the lye, which was injected into the heat flues; but technical defects caused the apparatus to explode during its trial.[24] An ordinary country potash plant cost about $20 in addition to the kettles. In New York, Connecticut, and probably in other colonies, this industry began to centralize slightly at village works, which bought ashes from farmers, and probably on account of more experience made better potash.[25]

The brick and tile yards and potters' kilns usually found near larger colonial towns made both soft and glazed brick, roof and enameled tiling, and plain and decorated pottery. Brick molds were iron shod and of prescribed dimensions, and potters ground their clay in iron mills. Tiles were molded and grooved by hand and pottery was shaped upon the foot-wheel. In technical development and organization these manufactures were very close to workshop crafts, and were conducted by individuals or copartnerships. Yet some of the larger undertakings involved the use of what was for the day a considerable capital. As early as 1664 a New York tile-kiln was rented for the equivalent of $1,500 per annum, and a brick-kiln belonging to the same owner for one-third that amount. The property must have been valued at $25,000 to $30,000.[26]

In colonial times brewing as well as baking was both a household industry and a specialized trade. Bakeries for making ship's bread some times were combined with merchant mills.[27] No mechanical progress had occurred in this industry since the days of the Romans, and the methods of the exporting bakehouse were the same as those of the farmhouse kitchen. Breweries usually had their own malthouses, but malting often was conducted as a separate industry. Barley, wheat, Indian corn, and rice were malted for fermentation.[28] A typical colonial brewery, advertised for sale at New Brunswick, was 70 by 48 feet, with a malt cellar 70 by 14 feet and a copper holding 23 barrels. There was a malt mill that went by horse-power. The works also included a storehouse 30 by 21 feet, having a beer cellar with a brick floor, besides

[24] Bishop, *History of American Manufactures*, II, 56 (note).

[25] Thomas Stephens' Petition, in House of Commons, *Journal*, 1755, XXVI, 234, 240; La Rochefaucault, *Travels through North America*, I, 385; Judd, *Hadley*, 386; advertisement, *New York, Journal and General Advertiser*, Jan. 5, 1769, in New Jersey, *Archives*, XXVI, 348; Smith, *Tour of Four Great Rivers*, 33; letter of Peter Hasenclever to Sir William Johnson, Oct. 23, 1763, in Johnson, *Papers*, XI, 279; Stephens, *On the Manufacture of American Potash*, and *The Rise and Fall of Potash in America*.

[26] Bishop, *History of American Manufactures*, I, 223.

[27] *E. g.*, advertisement, *New York Gazette*, May 9, 1763, in New Jersey, *Archives*, XXIV, 177, 178.

[28] Barley, Massachusetts Historical Society, *Collections*, Ser. II, vol. III, 188; wheat, Kalm, *Travels into North America*, II, 88; Indian corn, Weeden, *Economic and Social History of New England*, I, 201; Byrd, "Progress to the Mines," 347, in *Writings;* rice, advertisement, William Hornby, Charleston, South Carolina, in *Royal Gazette*, Sept. 29, 1781.

negroes, live-stock, and dwellings for the employees.[29] Some Pennsylvania breweries were nearly twice this size, but in none of them did the process of brewing differ in any essential respect from that used in the household. The utensils were mostly of wood and the operations were performed by hand. Hand pumps were used, malt was ground between stones, steam heating was not practiced, sterilizing, except by boiling, was unknown, and there was no refrigeration. With the exception of strong porters, made for ships' use and exportation, most beer and ale was consumed immediately. Some country breweries represented an investment of less than $1,000, and what were accounted considerable establishments sold for twice or three times that sum. Usually they were owned by individuals or partners.

We get glimpses of colonial processes for making leather from the early laws providing that tanners must not overlime, burn, or hot-wooze their hides, and that curriers must not use poor materials, but good hard tallow, "as much as the leather will receive."[30] Even at an early date some colonial tanneries were large establishments for the period and used imported materials. The inventory of a New England tannery, in 1653, showed 415 hides in the bark, valued at about $2,000; 45 hides in the lime worth over $100, and 312 West Indian hides in the lime worth over $600.[31] Yet the process of tanning was very slow, and a century later the equipment of even the better establishments was limited to a number of small wooden boxes or vats sunk in the ground near a stream, without outlet or shelter, and either open pools or similar vats above ground for liming. An open shed sufficed for a beam house, while the bark was crushed at the rate of half a cord a day by alternate wooden and stone wheels drawn round a circular trough some 15 feet in diameter.[32] Bark mills are mentioned as early as 1661, and probably were in use previously, though at this period they were seldom if ever driven by water. Some of the first mills seem to have been owned in partnership by several tanners.[33] In New England and New York the principal tanning material was hemlock bark, while the central and southern colonies used oak bark, which made better sole leather. A representative colonial tannery, situated at Trenton, had 64 vats, 5 limes, 2 water pools, a bark house holding 300 cords, a currying shop and a skin dresser's shop, and facilities for making leather breeches.[34] The use of this article for clothing probably

[29] Advertisement, *Pennsylvania Gazette*, Sept. 15, 1748, in New Jersey, *Archives*, XII, 487; advertisement, *New York Gazette*, Sept. 19, 1763, in New Jersey, *Archives*, XXIV, 234; advertisement, *New York Gazette and Weekly Postboy*, Dec. 11, 1852 in New Jersey, *Archives*, XIX, 208; advertisement, *New York Gazette and Weekly Mercury*, Mar. 25, 1776, in New Jersey, *Archives*, Ser. II, vol. I, 74.

[30] *E. g.*, Massachusetts Bay, *Laws*, 1660, 48.

[31] Suffolk, *Probate Records*, III, 3.

[32] Pattee, *Braintree*, 605 (note).

[33] Bishop, *History of American Manufactures*, I, 440, 442.

[34] Advertisement, *New Jersey Gazette*, Apr. 23, 1778, in New Jersey, *Archives*, Ser. II, vol. II, 180; *cf.* also advertisement, *Pennsylvania Gazette*, Aug. 9, 1750, in New Jersey *Archives*, XII, 664.

explains the introduction of fulling or beating mills, operated by water-power, which were used to render leather pliable and possibly to finish its surface. In 1741 there were "two fulling mills for the fulling of leather" in Dorchester, and among the early water-rights granted at Salem was one for a "wash leather mill."[35] Though colonial tanners were importers of skins and exporters of leather, and their trade extended not only to other colonies but also to Spanish America, we have no record of large companies or of British capital engaged in this industry. The businesss was not fostered by special privileges, and most of the laws affecting it were restrictive.

Even in colonial days the term "mill" was applied to establishments for making paper, because power machinery for grinding rags to pulp was a necessary part of their equipment, though most of the processes of manufacture were still purely manual. In a New England paper mill, about the time of the Revolution, rags were first cut by hand on a scythe fixed in a post, then ground by water-propelled "engines," consisting of two rollers, 2 feet long by 26 inches in diameter, running over an iron bed-plate containing the macerating knives or ridges. This was the only process in which power was employed. The pulp was molded into sheets, pressed, dried, sized, glazed, and finished by hand labor. The capacity of a "two-engine," two-vat mill did not exceed 250 pounds of paper in a fifteen-hour day, and three months elapsed between the first operation and the final preparation for market.[36] A knowledge of this craft was less generally diffused than that of brewing or tanning; so labor limitations were at times an obstacle to its extension. While the method of manufacture just described does not differ essentially from that now employed for hand-made paper, modern bleaching processes were unknown; consequently the industry was more dependent on a proper selection of materials than at present, and this also checked its expansion. There were more mills in Pennsylvania than in Massachusetts, partly because linen was more generally worn in the warmer colonies. The first mill in America was a company enterprise, and like its successors in part an adjunct of a printing-office and stationer's shop.[37] The printers were pioneers in the policy of rendering themselves independent in their supply of raw materials. Though no large paper-manufacturing companies existed, it was not unusual for the same person to own an interest in several mills, and Benjamin Franklin promoted 18 such establishments in the vicinity of Philadelphia.[38]

Glass works encountered two obstacles in the colonies that account

[35] Advertisement, *Boston Newsletter*, Apr. 24, 1741; advertisement, *Boston Evening Post*, Feb. 8, 1748; Felt, *Annals of Salem*, II, 183.

[36] Crane, *Early Paper Mills of Massachusetts*, in Worcester Society of Antiquity, *Proceedings*, 1886, 122; *cf.* also La Rochefaucault, *Travels through North America*, II, 257, 258.

[37] Pennsylvania German Society, *Proceedings*, IX, 214–220; Lancaster County Historical Society, *Publications*, I, 324, 325; *Pennsylvania Magazine of History*, X, 18, 79.

[38] Brissot, *Voyage*, I, 324 (note); *cf.* Wheelwright, *New England's Pioneer Paper Makers.*

largely for the rare success attending such enterprises; they continued experimental until the furnace clay, sand, lime, and other material upon which they depended had been tested, and they employed a highly specialized kind of skilled labor. The first two works, those established by the Virginia Company near Jamestown[39] and the longer-lived undertaking at Salem,[40] were conducted with associated capital, but we have obscure knowledge of several small undertakings by individuals. The largest glass house erected in the colonies was built at Mannheim, Pennsylvania, by Baron Stiegel, and it is related that a coach and four could turn around within the brick dome of his melting-house. Probably the first flint glass made in America was produced at this place, and some of its tableware was of fine quality and not without artistic merit. But though the owner claimed to derive an income of over $13,000 a year from the enterprise, this did not prevent financial embarrassments overtaking him five years after it was started.[41] Meanwhile a smaller glass house across the Delaware was supporting in modest affluence three generations of German craftsmen.[42]

Except nail-making, which was partly a mill industry and partly a household trade, the reproductive manufacture of iron and steel in colonial times was entirely a workshop craft. Hollow ware was usually cast directly from the ore. Primary iron manufactures employed six styles of plants—bloomeries, ore furnaces, remelting furnaces, steel furnaces, forges, and slitting mills. A bloomery was simply a large blacksmith's forge, generally with a power-driven bellows, or a small furnace without a stack, in which rich ores could be deoxydized in an open charcoal fire so as to form a semi-molten mass or bloom of wrought iron, which was refined by hammering upon an anvil. Almost any country smithy might become a bloomery upon occasion, and we have no record of how often small quantities of iron may have been made in this way. Such works were built at an early period in eastern Massachusetts and along the coast of Long Island Sound, to utilize the bog ores of the neighboring ponds. They required but little capital, could be built profitably near small ore bodies which a furnace soon would have exhausted, and they produced wrought iron for farm implements, nails, and coarse tools, such as a frontier countryside demanded, in quantities that supplied but did not overstock a neighborhood market. Many of the most successful were individual enterprises, conducted by mechanics who combined primary and reproductive manufacture

[39] Two early attempts were made by the Virginia Company; Bruce, *Economic History of Virginia in the 17th Century*, 441; Bishop, *History of American Manufactures*, I, 25, 26, 30, 202; Virginia Company of London, *Abstract of Proceedings*, I, 130.

[40] Essex Institute, *Historical Collections*, XVI, 1–7; *cf.* also *id.*, IX, 80.

[41] Pennsylvania German Society, *Proceedings*, IX, 417; Barber, *American Glassware, Old and New*, 37; Bishop, *History of American Manufactures*, I, 238; *cf.* also advertisement, *Pennsylvania Gazette*, Mar. 23, 1769.

[42] New Jersey, *Archives*, X, 30 (note); *cf.* also *id.*, VI, 98; *Pennsylvania Magazine of History*, IX, 344, Oct. 1885; Barber, *American Glassware, Old and New*, 11, 12, 13; Bishop, *History of American Manufactures*, I, 574.

by working up into utensils the iron they produced, and allowed the bloomery proper to lie idle in a period of dull demand instead of seeking markets elsewhere. But as soon as the rock ores of the interior highland were developed, such bog ores as remained were used mostly in furnaces for casting hollow ware, for which they were better adapted because of the tough iron they made. Thereafter some bloomeries were built in the mountains, not only to supply local custom but also to make bars for an outside market. These larger bloomeries were more usually company undertakings than were their predecessors.

Colonial ore furnaces did not differ in general construction from those now in use, nor were they improved materially in detail prior to the Revolution. They consisted of a hearth and stack, blown with a leather or wooden bellows driven by water-power, producing a cold blast through a single tuyère. Charcoal was the only fuel, limestone or sea-shells the flux, and ores fished with an oyster rake from the bottom of a pond or dug from open trenches, usually without blasting, supplied the mineral.[43] The exterior walls were of brick or stone, the lining of the same materials of imported or of local origin. One of the first obstacles to the progress of the furnace industries in the colonies was the slowness with which fire-resisting clays and stones were discovered. The first iron works in the United States that existed long enough to take a place in the history of industry were established at Lynn in 1643, and consisted of a furnace, forge and slitting mill.[44] Such a furnace produced pots, kettles, and other hollow ware, cast directly from the ore, as was the custom in England for a century thereafter, and also ran iron into sows or pigs which were reheated and forged into wrought bars.[45] As yet pigs were not made for remelting. The capacity of the Lynn furnace, 8 tons a week, ranked with the larger establishments of this kind either in America or abroad. About the year 1700 what were described as the finest iron works in Europe had a capacity of only 750 short tons per annum, from two furnaces.[46] For the century and a quarter after the Lynn furnace went into blast there was little technical improvement in colonial furnace construction or practice, of which we have record, although doubtless the skill of American ironmakers improved. Indeed, the Pennsylvania and New Jersey furnaces of the eighteenth century were, in construction and capacity, but little behind the charcoal furnaces of the United States prior to the Civil War, and one or two of them remained in operation until that period. Local materials were found for furnace linings, and to the Germans we owe

[43] Kalm, *Travels into North America*, I, 236, 237; Byrd, "Progress to the Mines," in *Writings*, 352; Massachusetts Historical Society, *Collections*, Ser. I, vol. III, 175, 176.

[44] Corning, *The First Iron Works in America*, 7.

[45] *Cf.* Douglass, *British Settlements in North America*, II, 109. Pigs were made in the middle colonies before Douglass's time; Lieut.-Governor Gordon to Lords of Trade, in British Museum, *King's Manuscripts*, 205, *f.* 495.

[46] Winthrop, *History of New England*, II, Appendix, 435, letter, July 30, 1648; Weyhmann, *Geschichte der Aelteren Lothringischen Eisenindustrie*, 113.

the use of slate for this purpose as well as a number of other improvements in the industry. The usual dimensions of such a furnace varied from 20 to 35 feet in height and 8 to 9 feet in the bosh, and 25 tons a week while in blast was the normal output. A blast lasted 16 or 18 weeks. In the central and southern colonies furnaces were often idle in the summer, because it was difficult to obtain labor during the hot season and the busy period upon the farms.[47]

Furnaces for remelting iron and for making steel were, strictly speaking, plants for reproductive manufactures, but their technology is associated closely with that of ore furnaces. The remelting works consisted of a stack with a grate fire at the bottom, mineral coal being used as fuel in at least one case. By means of a regulated draft the flames and heat of the fire were made to play over pigs of iron upon an elevated hearth from which the molten metal ran down to a heated reservoir.[48] There was a furnace of this character in Virginia, one in New York, and probably others of similar construction in New England and Pennsylvania. Cupola furnaces, in which pig-iron and fuel were in immediate contact, were also used for remelting, especially in Massachusetts.[49] Sand molds were not used when the first colonial castings were made, but were introduced in that colony by an iron-maker who received recompense from the public treasury for the improvements he introduced.[50] Previously molds had been made of clay. Remelting furnaces usually were covered, but smelting furnaces were built in the open.

We know little of the construction of colonial steel works from descriptions of particular plants. They consisted of a furnace or "air oven" in which iron bars were placed about an inch apart and heated together with a mixture of coal dust, horn shavings, and ashes, in the course of which process the iron was carbonized sufficiently to form tool steel and incidentally become covered with blisters, whence the name "blister steel" was applied to the product.[51] The stone furnace-house of the Trenton works, which may have been the most extensive in the colonies, was 30 by 34 feet, and the entire plant, including a smith's shop, occupied a site of but half an acre.[52]

To nearly all the smelting furnaces were attached refining forges for making bar iron, though on account of the necessity of finding water-power and fuel the two establishments were not always in the same place or even the same vicinity. The forge consisted of one or more

[47] Bishop, *History of American Manufactures*, I, 544, 553; *cf.* Cushing, *New Hampshire Iron Company*, 8.

[48] Byrd, "Progress to the Mines," 376–377, in *Writings*.

[49] Douglass, *British Settlements in North America*, I, 540; *cf.* Massachusetts Historical Society, *Collections*, Ser. I, vol. IX, 258–260; Governor Moore to Lords of Trade, 1767, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VII, 888.

[50] Massachusetts, *Acts and Resolves*, 1st sess., 1732–1733, Chap. 94; 4th sess., 1739–1740, Chap. 92, in vol. XI, 689, and XII, 658; Massachusetts, *Archives*, LXI, 314.

[51] Acrelius, *History of New Sweden*, in Pennsylvania Historical Society, *Memoirs*, XI, 167.

[52] Advertisement, *Pennsylvania Gazette*, Aug, 29, 1765, in New Jersey, *Archives*, XXIV, 605.

fires and tilt-hammers operated by a water-wheel. The sow of iron, weighing 60 or 70 pounds and not unlike our modern pigs, was heated, and hammered under a heavy hammer until it lost its granulated structure and was freed of dross, when it was turned over to a second crew, who with a smaller hammer "drew" it into the bars of commerce. Rolling mills and puddling-furnaces for refining were unknown. There were also a few trip-hammers and plating forges in the colonies, where bars were worked into other shapes, especially into rods, flat iron, and sheets. So primitive was the machinery of all these plants that a separate water-wheel was usually required for each hammer and bellows. Slitting mills, like the plating forges, generally were independent establishments, not necessarily connected with plants for primary production and more often associated with reproductive manufactures. In these mills cold bars, which had been cut with shears into pieces 13 to 20 inches long, were heated in a coal or charcoal fire to a white heat, when they were run between smooth rollers which drew each piece to three times its former length and to a thickness suitable for nails. Immediately after leaving the rollers the flattened bar was run between cutters which slit it into five or more rods, according to its width. Separate water-wheels drove the rollers and the cutters. Such a mill would produce enough rods to keep 300 nailmakers constantly employed.[53] The flattened bars without slitting could be made into shovels and other implements. In making farm tools, scythes, and similar articles, however, a small trip-hammer or plating forge was employed more generally to flatten and shape the iron, and sheet-iron always was manufactured with the same apparatus.

Slitting mills and plating forges were usually owned by individuals or firms, and required little more capital than a gristmill or sawmill; indeed, one such establishment was operated illegally in a gristmill building, where it was so well concealed in a lower room as to escape the notice of an inspecting official.[54] But smelting furnaces and the forges associated with them were often company enterprises, the largest of which approached in extent of capital and of operations a fair-sized modern corporation. Each person interested owned one or more shares or fractions, which might be subdivided, and which did not always, as we might assume, apply to the entire unit of property under collective control. Thus in 1755 there were offered for sale at auction one-eighth and two-thirds of a one-sixth part of Sterling Furnace, and similar fractions of a dwelling-house and 600 acres of land forming part of the same property, as well as seven-eighths of a forge 3 miles from the furnace and apparently operated in connection with it.[55] The original Lynn furnace and forge were owned by a company formed on

[53] See page 510; Harrison, "The First Rolling Mill in America," in American Society of Engineers, *Transactions*, II, 103–105 (1881).

[54] New Jersey, *Archives*, XII, 674 (note).

[55] Advertisement, *New York Mercury*, Oct. 20, 1755, in New Jersey, *Archives*, XIX, 548.

a similar plan, partly with English and partly with colonial capital, and the money to build the forge appears to have been raised independently of that for the furnace, though possibly not with the idea of separate ownership.[56] When the Principio Company was formed in England there were ten equal shares owned by the seven original undertakers, who collectively transferred one share to their manager in America, but these fractions were reckoned as distinct for each property. Thus Joshua Gee owned two-ninths of the Principio Works and two-ninths of the Potomac Works, and John Wightwick owned one-ninth of each of the works respectively.[57] Some colonial ironmasters were interested in several different furnaces and forges, though these were not grouped even into the inchoate kind of a company just described. The principle of community of interest was understood and practiced. In eastern Massachusetts the owners and managers of furnaces met, either on special call or as a more or less permanent association, to consider "affairs of importance to the better improvement" of their business.[58]

The early iron works upon the James, which were destroyed by the Indians just as they were reaching completion, are said to have cost the Virginia Company between $20,000 and $25,000, equivalent, of course, to more than that sum at the present day.[59] The Lynn Company started with about $5,000 of cash capital, but received some encouragement from the colony and considerably increased its funds from local sources. However, it probably did not invest altogether more than half as much as its Virginia predecessor. During the seventeenth century the most prosperous iron ventures in America were small undertakings, comparable with large blacksmith's shops, that could be erected with the means of a single individual. It was the presence of capital as well as natural resources that caused the iron industry to get so firm a foothold in Pennsylvania and New Jersey, and William Penn himself was one of the promoters of works in the latter colony. In that vicinity were formed the first strictly local companies for undertaking iron works on a scale large enough to give a capitalist character to this industry. Soon afterwards English money was invested liberally in such enterprises in Virginia and Maryland. Like its Principio neighbor, Governor Spottswood's furnaces in the former colony were financed, at least partly, in Great Britain.[60] The Principio Company ultimately built or acquired and operated four furnaces and two forges, and owned over 30,000 acres of land. Three English partners received nearly $118,000 from the British Government as compensation for their

[56] Swank, *History of Iron in All Ages*, 109.

[57] *Principio Papers*, in British Museum, *Additional Manuscripts*, 29600, *f.* 9. All these companies were organized on the English model; *cf.* Mantoux, *La Révolution Industrielle*, 308–309.

[58] Advertisement, *Massachusetts Gazette*, Oct. 7, 1773; *cf.* Byrd, "Progress to the mines," 362, in *Writings*.

[59] Bruce, *Economic History of Virginia in the 17th Century*, II, 446–449.

[60] Byrd, "Progress to the Mines," 378, in *Writings*.

losses at the time of the Revolution, while another of the partners, who sided with the colonists, received one of the forges from the State of Maryland as his share of the works;[61] the remainder of the property was sold by the State, in 1781, for $240,000.[62] Yet it appears that this company continued to the end under the loose organization with which it started. Iron undertakings still more ambitious in design, though less permanently successful, were inaugurated in northern New Jersey, toward the close of the colonial period, by Peter Hasenclever. The headquarters of this company continued to be in England, and, like the Principio Company, it is to be rated as a British enterprise. Hasenclever controlled six blast furnaces, some of exceptional size for the time, three of which had an aggregate capacity of 60 to 75 tons of pig a week, and seven forges with 19 fires and 12 hammers, and a capacity of 60 tons of bars a week, in addition to a stamping mill to stamp iron from the cinders of the cinder banks, three sawmills, and one gristmill. In these and subsidiary works over $250,000[63] were invested within three years. This was the largest industrial enterprise attempted in America previous to the Revolution, but though the colonies were the field of its operations, and benefited by the technical improvements and broader ideas of organization and administration which such a company introduced, it was essentially European in its business character and does not represent a stage in the indigenous development of industrial organization.

A mill in colonial parlance meant one of two things, either a contrivance for grinding or any machinery operated by animal power, wind, or water. The main source of power employed by the colonists was furnished by the small streams found everywhere along the North Atlantic seaboard.[64] At one time windmills were not uncommon in the districts settled by Dutch colonists and elsewhere along the coast, and were used both to grind grain and to saw lumber.[65] Where it was difficult to get a water-head and windmills were not resorted to, tidemills were constructed, as at Boston and on the north shore of Long Island. A dyke was built across the mouth of a marsh or inlet, so arranged that the tide could enter and fill the reservoir thus formed, where it was retained until the receding ocean left a head sufficient to turn for a few hours an undershot water-wheel.[66] In colonial days the rivers and creeks afforded many more water-powers than at present, because streams have dried up as the forests were cut away, and because the modest ambition of the mill-owners of that period was satisfied with diminutive plants that at the present time would not repay the cost

[61] *Chalmers Papers, Maryland*, in New York Public Library.
[62] Maryland, *Revolutionary Laws* (ed. Hanson), May 1781, Chap. 33; Nov. 1782, Chap. 2.
[63] *The Case of Peter Hasenclever*, 67; also New Jersey, *Archives*, IX, 583–584 (note).
[64] Crèvecœur, *Lettres d'un Cultivateur Américain*, III, 465.
[65] O'Callaghan, *Documents Relative to the Colonial History of New York*, I, 299.
[66] Kalm, *Travels into North America*, I, 184; Crèvecœur, *Lettres d'un Cultivateur Américain*, II, 87.

of attendance. A sawmill that could cut 1,000 feet of boards a day was reckoned an average establishment, and the merchant mill whose flour had the highest repute of any exported from the Philadelphia market could not be counted on for more than 10 to 20 barrels a week during the shipping season.[67] The great water-powers of New England and the central colonies were not utilized until after the Revolution. Colonial mills were built on creeks and rivulets and on the smaller rivers, where the expense of a dam and canal did not exceed the limited means of the colonial manufacturer. These little establishments performed the greatest variety of service. Not only did they saw lumber and grind grain and full cloth—the most usual of the mill industries—but they ground rags, plaster, powder, malt, flaxseed, chocolate, mustard, and tobacco; they broke hemp and fulled leather; not only did they drive the forge bellows and operate the blacksmith's hammer, but they ground scythes and knife-blades, bored rifles, and slit iron. Their mechanism was crude and primitive. Most of the wheels were undershot, and utilized but a fraction of the water-power that was applied to them. We have seen that power transmission was so little understood that a separate wheel was generally necessary for each article of machinery. The wheels and most of the mechanism were of wood. The invention of improvements by which several different kinds of apparatus—threshing and winnowing machines, grist and bolting mills, and flax beating and cleaning machinery—could be operated by a single wheel, is attributed to a Connecticut mechanic, who not long before the Revolution received a premium of £20 from the London Society of Arts for his devices.[68] We are told of this mill that "either branch may be discontinued without impeding the rest." The Swedish traveler Kalm was informed by a New Jersey miller that the axletrees of mill-wheels in that locality were made of white oak, and that they continued good three or four years. The cogs of the mill-wheel and the pulleys were made of "white walnut tree" [hickory], because it was the hardest wood to be got in the vicinity.[69] Peter Hasenclever, the German ironmaster, appears to have been the first to wind the hammer wheel shafts of his forges with cast iron, whose arms served as cogs to lift the hammer-handle.[70] But the cranks of sawmills and gristmills were probably always of iron. As early as 1646 Massachusetts granted a patent to Joseph Jenks, an iron-worker, for "making the engines for mills to go by water," and probably from that date onward mill-irons were forged in New England. In 1765 the Sterling Furnace was making "mill spindles, wrines and iron axle trees, cast mill rounds and gudgeons, fuller's plates, forge plates, forge hammers and anvils," and

[67] Smith and Sons, *Manuscript Letter Book*, Letter Oct. 23, 1770.

[68] Anburey, *Travels through the Interior Parts of America*, II, 260–261; *cf.* also Crèvecœur, *Lettres d'un Cultivateur Américain*, III, 514.

[69] Kalm, *Travels into North America*, I, 328.

[70] Report to Governor Franklin on Hasenclever's enterprises in America, in *The Case of Peter Hasenclever*, 71.

in 1776 the Batsto Furnace advertised, among other ironwork, "sugar mill gudgeons, neatly rounded and polished at the ends, gristmill rounds, rag wheel irons for sawmills."[71] In short, water-wheels, shafting, the framework of all machinery, and most of the moving parts were of wood, the gudgeons or journals being of metal to save friction at the bearings, and the cranks—as just mentioned—being of forged iron.

The more primitive type of sawmill consisted of a single sash saw, pulled downward by the water-wheel crank and upward by a large elastic pole. The log was moved forward to the saw on a carriage driven by a cogwheel, or in some cases by a weight passing over a pulley. Such a mill, attended by a man and a boy, would in a working day saw 1,000 feet of pine lumber. It stood idle for lack of water during the drought of mid-summer and the frost of winter; and with the clearing of the forests many former mill-sites were abandoned permanently because the streams that supplied them disappeared.[72] Gangs of saws must have been used at an early date; two saws working together were very common, and we are informed that four saws were operated in one mill in New Hampshire in the year 1700, while in New York a mechanic recently arrived from Holland had introduced a gang of twelve saws in one of the Livingston mills.[73] In 1769 gangs of 14 saws were in operation in the Mohawk Valley, where there was a commercial lumber industry, but they were unusual or unknown in New Jersey and Pennsylvania.[74]

In 1705 a Pennsylvania mill-owner described his sawmill as occupying a building 32 by 70 feet, adding, "We have two cranks upon the shaft of the sawmill wheel, and two carriages, and can cut with one saw seven or eight hundred feet of inch boards a day, and more sometimes when the water is high, timber good and well followed, viz., 1,000 feet. With two saws together she will cut 12 or 15 hundred feet in a day, or in about 12 hours time."[75] This was near Philadelphia. Such a mill was expected to earn gross £400 a year, from which something over a third was deducted for labor, and maintenance.

A project for a sawmill in Virginia towards the close of the Revolution contemplated a two-saw plant, cutting the same amount of lumber as the one just described; and during the eighteenth century there appear to have been no marked improvements either in the size or in the mechanism of these establishments. At a very early date it was estimated that a mill would do the work of twenty hand

[71] Bishop, *History of American Manufactures*, I, 531; advertisement, *Pennsylvania Journal*, May 8, 1776; New Jersey, *Archives*, Ser. II, vol. I, 98.

[72] Douglass, *British Settlements in North America*, II, 55.

[73] Bellomont to Lords of Trade, Jan. 2, 1700, in O'Callaghan, *Documents Relative to the Colonial History of New York*, IV, 825.

[74] Smith, *Tour of Four Great Rivers*, 26.

[75] S. Carpenter to Johnathan Dickenson, 1705, in Pennsylvania Historical Society, *Memoirs*, IX, 233, 234.

sawyers, and an account of New York published in 1708 said that one of the Dutch mills would do the work of fifty men.[76] The latter may have been a rhetorical exaggeration, unless the author meant the twelve saw gangs already mentioned, which at that date must have been unusual, and possibly unique, even in that colony. Probably the early mills could not handle hardwoods to advantage; at least that is an inference from the statement of the deputy governor of New Jersey, in 1683, that although the price of boards for building was "abated half in half" by the introduction of sawmills, yet oak and chestnut boards were no cheaper.[77] Even as late as 1795 a French traveler noticed, in the vicinity of some of the Maine mills, hand sawyers at work on great blocks of timber, probably for ship-building, adding: "Such is the practice throughout America, and it is owing to the present imperfection of the sawmills."[78] None of the 50 sawmills on the Cape Fear reported by Governor Tryon, in 1767, could supply lumber exceeding 30 feet dimensions, "owing to the difficulty of raising a greater length of timber upon the stages of the mills."[79] However, shortly after that date a mill at Trenton was capable of sawing logs 63 feet long, and of corresponding diameter, and oak boards of large dimensions were frequently mentioned in colonial bills of lading and commercial accounts.[80] Among minor improvements about this time was an attachment for drawing logs up to the mill from the millpond, by means of a rope winding on the wheel axle, enabling a single man to operate all the machinery; and at the close of the Revolution cylinder bearings were introduced in the Massachusetts mills, with the result that much power was saved.[81]

Small sawmills were usually individual enterprises, and frequently sawed on toll. They cost, including a dam, from $500 to $1,000, or about as much as a farmer's home. Usually they were housed in open sheds, and there was no part of them that was not, in the later colonial period, made in the country. Saws were manufactured at Philadelphia, and probably in New England.[82] Larger mills were owned on shares, sometimes in fractions as small as a tenth, and often were adjuncts of manufacturing enterprises involving the use of considerable capital.[83]

Mills for grinding were operated by hand, by horse-power, and by

[76] Bishop, *History of American Manufactures*, I, 105; *cf.*, however, advertisement, *New York Gazette and Weekly Postboy*, Aug. 18, 1755, in New Jersey, *Archives*, XIX, 528.

[77] Whitehead, *East Jersey*, 411; Bishop, *History of American Manufactures*, 109.

[78] La Rochefaucault, *Travels through North America*, 434.

[79] Governor Tryon to Lords of Trade, Feb. 2, 1767, in British Museum, *King's Manuscripts* 205, *British Transcripts*, Library of Congress, 23.

[80] Crèvecœur, *Lettres d'un Cultivateur Américain*, III, 534, 535.

[81] Crèvecœur, *voyage dans la Haute Pensylvanie*, II, 383; Chastellux, *Travels in North America*, II, 310.

[82] Smith & Sons, *Manuscript Letter Book*, letter to Jackson and Broomfield, Nov. 26, 1767; Corning, *The First Iron Works in America*, 7; *Cf.* Cushing, *New Hampshire Iron Company*, 4.

[83] *E. g.*, advertisements, *Pennsylvania Gazette*, Feb. 26, 1756; Mar. 9, 1758, in New Jersey, *Archives*, XX, 7, 182.

wind or water, in this respect being distinguished from sawmills and stamping mills of various kinds, which seldom were driven by hand or by animals. Grain mills employed essentially the same machinery, whether operated by hand or by power. The New England pioneers sometimes pounded their maize to meal in samp mortars, and shops for making such mortars were established;[84] but generally in the colonies the most primitive contrivance for grinding grain was the quern mill, which continued in use in the southern mountains until the early part of the nineteenth century.[85] Grinding-surfaces were usually of stone, whether the substance to be ground was grain, rags, chocolate beans, malt, bark, mustard, flaxseed, sugar cane, or tobacco. However, early in the eighteenth century steel malt mills were in use and iron mills were employed for grinding potter's clay.

The first mill-stones used in the colonies were brought from Europe, but later many were supplied by local quarries. The Connecticut Valley mills used red sandstone or pudding-stone, probably from quarries on Mount Tom. One of the Trenton mills used "Esopus" stones, which appear to have had much reputation. Another New Jersey mill was advertised as having good Bucks County stones. But imported stones continued to be used; Cullen's were frequently mentioned, and French burrs were perhaps the most highly regarded of all. Soapstones, probably from local quarries, also were employed, and apparently merchant flour was ground with these in preference to Cullen's.[86] The ironwork of a gristmill partially destroyed by the British in one of their New Jersey campaigns was advertised in 1778 to contain a machine for raising and lowering mill-stones, two water-wheels, and three pair of stone, all running double-geared, and was housed in a stone building 37 by 52 feet, and 18 feet high.[87] Most of the merchant mills in the central colonies were covered by substantial structures, usually of stone, two or three stories high, and of dimensions sometimes exceeding those just quoted. The wheels were protected from ice and weather by being inclosed in the building itself; and in the winter the wheel-room was heated by a large stove, which also served to modify the temperature in the office or waiting-room for customers.[88] The establishment devoted to flour milling often include a storehouse for grain, which late in the colonial period became an elevator,[89] together with screens for cleaning wheat and bolting apparatus moved by water.

[84] Felt, *Annals of Salem*, II, 178.

[85] Byrd, "Dividing Line," 241 and note, in *Writings*.

[86] Judd, *Hadley*, 40; Pennsylvania Historical Society, *Memoirs*, IX, 100; advertisement, *Pennsylvania Gazette*, Nov. 20, 1766, in New Jersey, *Archives*, XXV, 249; Smith & Company, *Manuscript Letter Book*, letters to Starbuck & Company, Aug. 19, 26, 1769.

[87] Advertisement, *New Jersey Gazette*, Oct. 14, 1778, in New Jersey, *Archives*, Ser. II, vol. II. 481, 482.

[88] Crèvecœur, *Lettres d'un Cultivateur Américain*, III, 463, 464.

[89] Elevators are regularly advertised as part of mill equipment after 1748; *e. g.*, advertisement, *New York Gazette and Weekly Postboy*, Aug. 29, 1748, in New Jersey, *Archives*, XII, 481; *cf. id.*, XIX, 346, 548–549; XXV, 15, 47, 444; XXVI, 254.

Sometimes the bolting machinery was in a separate building, as in the case of the Courtlandt Mills, in New Jersey, where the bolting-house, with five bolts, was 42 by 21 feet, and connected with it and the mill was a bakehouse 32 by 26 feet with "two very fine ovens."[90] Here we have all the processes of manufacture combined, from receiving and cleaning the grain to exporting it in the form of barreled bread. Not infrequently a cooper's shop formed part of the plant. Such merchant mills are not to be confused with country gristmills, grinding only on toll for local custom, such as were most of the mills of the interior and New England. The merchant mills did custom work, often having special stones and bolters for this purpose, but their main business was producing flour for export, and these millers were large purchasers of grain from the surrounding country. Sometimes they held off for lower markets, or engrossed grain, forming local corners, and they certainly attempted to regulate the market by keeping back flour at dull periods and rushing it forward during periods of active demand in Europe and the West Indies.[91] The manufacture of flour thus became one of the most speculative American industries.

Shortly before the Revolution considerable improvements were made in America in the application of power to milling machinery and processes, thus displacing manual labor, and the mills upon the Delaware and Chesapeake were probably the finest at that time in the world. These improvements, which had been introduced gradually during the previous decades, culminated in the inventions of Oliver Evans, of Philadelphia, who perfected devices by which grain was elevated mechanically to the top of the mill or warehouse, cleaned during gravity transmission to the hoppers, ground, conveyed by screw transmission and a second series of elevators to the top of the building again, cooled, bolted, and barreled during its second descent, without the intervention of any manual operation. This may have been the first instance of an uninterrupted process of mechanical manufacture, from raw material to finished product, in the history of industry. In such a mill six men, mostly employed in closing the barrels, could convert annually 100,000 bushels of grain into flour.[92] But before the Revolution a mill that ground 100 bushels a day was considered of fair size. Some of the Virginia mills, upon the James and at Petersburg, had several run of stones and could manufacture 75,000 bushels of wheat yearly into flour.[93] We hear of no mills with more than 12 run of stone, and two-run mills were much more common than the larger ones.[94] Partly this was due to the cost of developing large water-powers

[90] Advertisement, *New York Gazette and Weekly Postboy*, May 9, 1763, in New Jersey, *Archives* XXIV, 177–178.

[91] An account of an attempt to corner the Philadelphia market in the summer of 1767 appears in the mercantile correspondence of that date.

[92] La Rochefaucault, *Travels through North America*, II, 250–253.

[93] Virginia, *State Papers*, II, 681.

[94] Crèvecœur, *Voyage dans la Haute Pensylvanie*, I, 376, III, 325.

which confined mills to smaller heads and reservoirs, where the power was sufficient only for two or three sets of stones; partly it was due to the conditions that sometimes caused a single firm to operate several plants—more particularly the cost of transporting grain from the distance necessary to supply a single large establishment. Many mills were shut down in dry weather, and a drought affected the price of provisions in the Philadelphia market as much by the scarcity of flour it occasioned as by its influence upon the grain crop. During a severe winter ice was equally effective in putting a stop to grinding.

Grain mills were relatively smaller employers of labor than were sawmills and iron furnaces, and their owners were to a less extent industrialists; nevertheless they employed considerable capital and in the aggregate played an equally important part in the economic life of the community. Most mills were operated by individuals or partnerships, but some were owned in shares as small as one-thirteenth or less. In a few cases this may have been due to the difficulty of finding capital except by the association of several persons, but more usually it was because the interest of an original larger owner became subdivided through sale or inheritance.

Next to sawmills and gristmills the most common use of water-power was to full cloth, which was a pounding operation and employed a mechanism not very different from that used to trip and release a forge-hammer. As such mills were not in operation constantly, they were often combined with other establishments, especially gristmills. The manufacture of powder also employed water-power. During the Revolution one mill of this kind occupied a number of buildings, of which the largest was 102 by 31 feet, and had in use three water-wheels, about 18 feet in diameter, which worked nearly 100 stampers, beside the graining sieves and bolters.[95]

Technically colonial mills were abreast of the English, and probaby in advance of them.[96] Continental mills were better than those of Great Britain, and it appears that some improvements were introduced into the colonies from Holland before they were received by the mother country. But we have evidence that even persons familiar with European mills considered those of the colonies superior. The improvement in power transmission and gearing that enabled several machines to be run from a single wheel-shaft was undoubtedly original in America,[97] though possibly not first invented here; and minor labor-saving devices, such as log-carriers in sawmills and grain-elevators in flour mills, were of American origin. French travelers also noted the application of power to more uses than were common in Europe.[98] The tradition of the superiority of American mills to those of England begins with

[95] John J. Howell to Owen Biddle, June 3, 1776, in Pennsylvania, *Archives*, Ser. I, vol. IV, 765–767.

[96] Thomas, *History of Pennsylvania*, 41.

[97] See p. 175 preceding.

[98] *E. g.*, Brissot, *Voyage*, III, 118; *cf.* Pownall, *Translation*, 13.

Thomas, in 1698, but the statements of European travelers as to their ingenious construction and wide use date mostly from the time of the Revolution.

INDUSTRIAL ORGANIZATION

As specialization and integration of industry are marked characteristics of the present age, so their opposites, generalization and dispersion, were equally obvious features of the colonial period. Upon the whole, too, industries were more migratory than at present and more influenced by uncontrolled and accidental circumstances. The main cause of the dispersion of plants was lack of transportation, which has already been noted; and the main cause of the want of specialization was the small and precarious market, which likewise has been mentioned. But another reason for the dispersion of power-employing industries was inability, for want of capital and engineering skill, to utilize large water-powers. Small water-powers were so likely to be interrupted by droughts or frost, or to disappear altogether, that the mills built upon them were oftentimes of temporary construction. Similarly, iron works were conducted most economically when they were built in accord with the modest extent of local ore-deposits and the probable lifetime of a stream likely to disappear with the clearing of forests. A French traveler thus described the process by which in New Jersey a bog was soon transformed into a fertile meadow. A dam was thrown across the outlet, with a water-wheel that blew a furnace or operated a forge-hammer, while the back-water of the mill-pond killed the trees that covered the swamp. In a few years the local ores were exhausted, the timber decayed or was consumed for fuel, and since the partial drying of the bog caused the water to fail, the dam was broken and, with a little draining, the former morass was converted into pasture or plowed fields.[99] Small sawmills likewise disappeared with the exhaustion of timber around them. Grain mills being more permanent, and serving an increasing use with the closer settlement of the country, were housed in masonry buildings and were more often situated upon large rivers, by which they received supplies of grain and sent their flour to market. Therefore these mills were the first to centralize and to coöperate in developing larger water-powers.

The lack of specialization, which was manifested in handicrafts by one man's following several different trades or conducting several skilled processes of manufacture, was indicated in establishments using power by the combination of several unrelated operations in the same mill. This was due not alone to the fact that a water-power constantly employed in making one thing might overstock the limited market accessible, but also to a desire to utilize constantly all the power available in what were for the moment the most profitable manufactures.

[99] Crèvecœur, *Lettres d'un Cultivateur Américain*, II, 226, 227.

A sawmill and a gristmill under the same roof were so common as almost to be expected, in some parts of the country, wherever there was a dam. In many places, especially in New Jersey, a forge was operated by the same power that ground grain and cut lumber. Sometimes four distinct mills, for lumber, flour, forging iron, and fulling cloth, were combined in the same establishment.[100] Probably in such instances either of the latter two undertakings would have proved unremunerative had it been necessary to employ for it the capital required to develop a water-power and build a separate mill.

The same dispersion and lack of specialization that were manifest in industrial plants and processes were characteristic of business organization. Most mills were owned by individuals, and where collective capital was employed there was no special form, such as a corporation charter, through which it operated. Many mills were combined with a farm or plantation, to which they sometimes seem to be more or less subordinate. Occasionally a city merchant figured as a mill-owner, and more often as controlling or owning a share in a furnace or forge. Few men above the artisan class followed exclusively manufacturing pursuits; consequently there was little special training for manufacturing as a business. These conditions were reflected in industrial organization, which remained entirely dependent on commerce and farming for its methods of finance and administration.

MANUFACTURING COMPANIES AND ASSOCIATIONS

Though the first manufacturing corporations in America date from the close of the colonial period, the business organizations from which they sprang were much older. British and Dutch commercial companies, such as founded Virginia, New York, and Massachusetts, were stock concerns, and the East India Company was in the modern sense a true corporation. No record remains of the articles of agreement governing the associates in the Lynn iron works and the larger mining and smelting companies of the following century; but in Great Britain at this time mines generally were operated by share partnerships, like the Principio Company in Maryland, and the iron industry appears not to have attained the specialized organization of the great trading companies.[101] Groups of colonial partners did not delegate their authority to a board of directors, they could not levy an assessment upon an individual member without his consent, the total amount of their stock and its subdivision were not fixed, and they did not conduct business under a public charter.[102] Several owners might bestow great authority on one of their members as manager, and some colonies pro-

[100] *E. g.*, advertisement, *Pennsylvania Journal*, Feb. 21, 1761, in New Jersey, *Archives*, XXIV, 484; advertisement, Simon Lothrop, of Norwich, in *Boston Newsletter*, June 6, 1728.

[101] Mantoux, *La Révolution Industrielle*, 308–309.

[102] Such partnerships, however, sometimes were known as "companies"; *e.g.*, Lancaster County Historical Society, *Publications*, I, 325.

vided by law that when a mill lay idle for want of repairs, any partner, without the consent or against the will of his associates, might restore it to working condition and operate it, and derive the benefit of the additional capital thus expended.[103] But, strictly speaking, there was no company or corporation law in the colonies, and especially there was no limitation of liability proportionate to the amount of each person's investment.

The direct descent of American industrial corporations, particularly those engaged in making textiles, seems to have been from the partly philanthropic manufacturing societies formed in Boston, New York, and elsewhere during the eighteenth century. In Boston several movements in the earlier part of that century resulted, about 1751, in the formation of the "Society for Encouraging Industry and Employing the Poor," which, as its name indicates, was primarily a public-welfare organization, though there may have been some remote idea of profit in the minds of the promoters.[104] The members were denominated "subscribers," and the first subscriptions were in £50 amounts or multiples of that sum. This society had annual meetings, elected trustees and officers, and probably modeled its organization upon that of a church, college, or other semi-public corporation. No individual liability for the debts of the society, beyond the amount of their subscriptions, appears to have been incurred by the members; and it is not certain that their votes were apportioned to correspond with their financial contribution.[105] During the next twenty-five years similar societies, probably with about the same form of organization, were established elsewhere in the colonies. They employed managers, or farmed out their work to an individual manufacturer, and had to some extent the financial and commercial interests of ordinary business firms, though their main purpose was to provide work for destitute persons and to promote manufactures as a measure of public welfare. In 1775, a society was founded at Philadelphia with the general aims just mentioned, called "The United Company of Philadelphia for Promoting American Manufactures," with a term of existence defined at three years and shares of £10 each, payable in installments. Provision was made for a board of 12 managers or directors, and other officers. Though apparently not chartered, this company conducted business as a corporation, manufactured woolen, cotton, and linen cloth, and during the first two years made a profit of 41 per cent per annum.[105] Operations ceased with the capture of Philadelphia by the British, in the autumn of 1777, and it was not until ten years later that a new society, apparently on the same basis and with the same objects, was formed and resumed making cloth in the factory that had been occupied

[103] *E. g.*, Massachusetts, *Acts and Resolves*, I, 641; Rhode Island, *Acts and Laws*, 1730, 264; 1745, 180; 1767, 190; Rhode Island, *Public Laws*, 1798, 504.

[104] Possibly there were two such societies about this time; *cf.* Bagnall *Textile Industries*, 31.

[105] Bagnall, *Textile Industries*, 29, 30, 33, 34; 63, 64, 71.

by its predecessor. Though this company did not have a public charter, the State of Pennsylvania subscribed for 100 of its shares.[106]

That larger organization of industry, in which the units are firms rather than individuals, had only a beginning during colonial times, but that beginning was not without interest as a prediction of future development. Before the first generation of Massachusetts settlers had passed away, we are told, combinations of artisan manufacturers in certain trades controlled prices. Temporary agreements for the same object were probably made among merchant millers and among tanners,[107] and the suggestion of an association of iron-masters that might have been partly for this purpose has been noted previously. Yet such trade associations must have been comparatively weak agencies for controlling prices, more like unions of farmers and cotton-growers for the same purpose than modern industrial combinations.

In one instance, however, such an agreement seems to have been fairly effective, and to have anticipated several features of modern monopolistic trusts. Peculiarly enough this controlled illuminants. In 1761 the leading spermaceti chandlers in the colonies, including all the firms except Moses Lopez of Newport and a company in Philadelphia, united in an agreement: (1) fixing the price to be paid for head matter, their raw material; (2) preventing any party to the agreement from manufacturing for a person not in the association; (3) preventing any person from becoming a member of the association without the consent of all the other members; (4) fixing the price at which sperm candles should be sold; (5) binding the parties to "do all in their power by fair and honorable means to prevent the setting up of any new spermaceti works."[108] Lopez appears later to have been admitted to the association, which must have included all the manufactures of sperm candles in New England, and the alliance was strengthened by requiring all raw material to be purchased through a single designated agent, who apportioned it to the different firms according to a specified schedule based upon 100 barrels, and prorated presumably upon their previous business. How long this agreement remained in force we have no way of knowing, but there are records of its existence in 1761 and 1762, and some price understanding was evidently continued three years later.[109]

Attention has already been called to the community of interest among colonial manufacturing establishments engaged in the same or related branches of business, effected by the distribution of shares in several enterprises among the same group of owners. A similar prac-

[106] Bagnall, *Textile Industries*, 78.

[107] Advertisement, *Boston Gazette*, Dec. 29, 1747.

[108] "The Commerce of Rhode Island," in Massachusetts Historical Society, *Collections*, Ser. VII, vol. IX [69] 88–92, 97–100; Nicholas Brown, *Papers; Hunt's Merchants' Magazine*, XXXII, 386–387, Mar., 1855; Weeden, *Early Rhode Island*, 329.

[109] Letter to Jacob R. Rivera, July 27, 1765, Smith and Son, *Manuscript Mercantile Letters*.

tice prevailed in ocean commerce for the purpose of distributing risk, but in case of industrial ventures it was due rather to the desire of a successful manufacturer to reinvest his capital in the business with which he was most familiar. Transportation and market conditions placed a limit upon the size of plants that could be conducted profitably in a single place, and the unreliability of hired managers made it difficult for the same owner to operate at several different points. It was a natural recourse in these cases to distribute ownership in such a way that there could be a proprietor supervising each important establishment. The effect upon competition was the same as if this policy had been adopted for the express purpose of regulating prices.

BEGINNING OF INDUSTRIAL TOWNS

Except as they afforded convenient supplies of raw material for making finer goods, lumbering, iron-making, and the other primary manufactures of the colonies did not cause secondary industries to assemble at local centers, nor did they themselves group at particular points; yet at several places there was a prediction, rather than a realization, of industrial towns, due either to the rise of industries at a settlement already favored by its position as a market or to the growth of population around a mill-site. The most notable concentration of mill industries in the colonies was at Wilmington, where an ample and reliable water-power in the chief grain-growing district of America was united with river and ocean navigation. This conjunction of favorable conditions caused flour mills first to assemble in the vicinity, and in 1762 a long race and a canal with head for overshot wheels were built. During the next twenty or twenty-five years 12 mills were erected in the immediate neighborhood, most of which produced merchant flour. A few years later 400,000 bushels of wheat were ground here annually and the flour exports were valued at $500,000. Within 40 miles along the Brandywine there were 130 improved mill-seats, occupied in part by sawmills, paper mills, powder works, and tobacco factories.[110] This valley of mill industries supported subsidiary manufactures, and at Wilmington small establishments were founded to make bolting-cloth and to weave woolens and cottons.

Lancaster was one of the leading industrial towns, as well as the largest inland town of the colonies. Early accounts of the place speak of the residents as mostly manufacturers. The surrounding country contained many small mills and a number of forges and furnaces, so that the town artisans had a ready supply of materials, and they were protected by a land journey of 60 miles from the too active competition of imported wares. Therefore this place had many metal workers and weavers relatively to the usual proportion of such craftsmen in the

[110] Winterbotham, *View of the United States*, II, 466, 467.

inland districts. The concentration of industries at a single point gave Lancaster products a particular reputation, while the association there of many workmen in the same crafts improved the skill of each and caused some specialization of manufactures.[111]

Germantown was a still older seat of textile and varied industries;[112] Trenton was a mill town with a mechanic population;[113] while even in early colonial days Lynn had already acquired a reputation for the manufacture of women's shoes. The last place was an example of the advantage an industry derives by being centered in one locality, both from greater division of labor and from the rapidity with which the improvements of the individual become the common stock of all workmen employed in the vicinity. The reputation of Lynn is said to date from the immigration of a single Welsh shoemaker, who opened his shop about 1750, though the town had made and exported footwear on a small scale for many years previously.

However, before the outbreak of the Revolution almost every town and countryside in eastern Massachusetts was supported partly by manufactures. According to the assessment rolls of Haverhill, in 1767, there were in the township 44 workshops and 19 mills, or 1 mill for every 15 residences and a workshop for less than 7 residences.[114] A few years after the Revolution a French writer, in describing the Middlesex-Boston district, wrote: "This part of America displays in every respect true European industry. In every village the streets along the roads are lined with shops. Cabinetmakers, shoemakers, saddlers, coachmakers and tanners are very numerous."[115]

The connection between a colonial center of manufacture and the industrial town that has succeeded it was sometimes purely accidental. Some religious communities, especially the semi-monastic organizations of the German Moravians, repeated the history of the medieval orders by fostering arts and crafts where general economic and social conditions were otherwise unfavorable to their flourishing. The members of these societies were attached to a particular place, and could not wander afield in search of new homes; they worked for the community and not for their private profit, and so were not diverted to kinds of employment that promised the largest immediate returns; they formed a coöperative group, where sufficient division and specialization of labor was possible to enable some members to acquire or maintain a high degree of skill. Bethlehem was a famous manufacturing center of this sort, but its colonial reputation had no part in the subsequent development of iron industries at that place.[116] At Ephrata,

[111] Bishop, *History of American Manufactures*, I, 111; Weld, *Travels in North America*, 95; *American Museum*, II, 188, XI, 187; Hazard, *Register of Pennsylvania*, VIII, 224, Oct. 1, 1831.

[112] Pennsylvania German Society, *Proceedings*, IX, 140, 185, 214, 216, 218; Kalm, *Travels into North America*, I, 70; Burnaby, *Travels*, 93; *American Museum*, IV, 48, 49.

[113] Crèvecœur, *Lettres d'un Cultivateur Américain*, III, 534, 535.

[114] Chase, *Haverhill*, 426.

[115] La Rochefaucault, *Travels through North America*, I, 399.

[116] Bagnall, *Textile Industries*, 26, 27.

near Lancaster, the brethren conducted a large printing-house, engaged in shoemaking, weaving, and stocking-knitting, partly for sale, and operated a fulling mill, a distillery, a flour mill, a sawmill, a paper mill, and an oil mill.[117] New Ebeneezer in Georgia and Salem in North Carolina were settled by the same sect, and an unrecorded connection may exist between the industrial aptitudes of these pioneers and the present prominence of the latter place as a seat of textile manufactures.[118] The Shakers, at New Lebanon, were also craftsmen who made their settlement reputed for several local manufactures. Yet no matter how complete we make the list of small centers that in colonial days attained something more than a neighborhood reputation for particular wares or commodities, the result only shows how rudimentary was the grouping of industries in those days, and a comparison with the present indicates that it had little or no influence upon the subsequent localization of manufactures. Lynn alone has remained devoted to a craft for which it had attained reputation prior to the Revolution. The larger colonial towns have become great cities, in which early industries have survived and expanded. Philadelphia has a nearly continuous record for the manufacture of worsted, going back to the seventeenth century.[119] But we look in vain for any definite survival of the mechanics' shops that in the Boston of the seventeenth century crowded Water Street, Mackerel Lane, Milk Street, and the Battery, where curriers, tanners, blacksmiths, carpenters, chairmakers, and boat-builders plied their trades.[120] In such cases the industry itself has been transformed, and now requires an environment which the old locality could not afford.

But though few industrial towns were founded in the colonies, many villages originated around a mill-seat. A contemporary writer described how a sawmill became the center of a clearing, where were established in due time a gristmill and a store, at first to supply the lumbermen and later to serve a growing farming community. The miller usually remained a local magnate, whose home assumed with increasing affluence something like manorial dignity.[121] Many colonial iron-masters ruled with almost feudal sway over a neighborhood settlement of their laborers and country people, and such enterprises often became the nucleus of a permanent village. The location of most up-river towns was determined by the presence of a water-power, though their subsequent importance might be maintained and increased by their convenience as a country market rather than by the industries that first attracted settlement to the site.

[117] Acrelius, "History of New Sweden," in Pennsylvania Historical Society, *Memoirs*, 399–400.
[118] Smythe, *Tour of the United States*, I, 217.
[119] Scharff and Westcott, *History of Philadelphia*, I, 146.
[120] See account of shops destroyed in the fire of March 20, 1760; *Boston Newsletter;* Boston Records Commissioners, *Records Relating to the Early History of Boston*, XXIX, 123–125, and *passim.*
[121] Crèvecœur, *Lettres d'un Cultivateur Américain*, III, 456; Kendall, *Travels*, III, 33.

ORIGIN OF THE FACTORY SYSTEM IN AMERICA

Factory is a shortened form of manufactory, which latter term in colonial times indicated a place where goods were made by manual processes more skillful than those used in a mill, but nevertheless requiring more elaborate equipment and division of labor than a workshop craft. The factory system, being a form of organization that depended upon technical developments still in the future, did not exist. But some features of that system were to be observed here and there in America, and the sources from which it sprang were defined.

The custom of gathering a number of workers in one room or building to carry on a process of manufacture was first adopted in spinning-schools. Workhouses in which petty offenders and the dependent poor were gathered also employed their inmates at spinning and weaving; and philanthropic companies for encouraging domestic industry devoted their capital principally to providing rooms and implements for textile manufactures. The very first generation of colonists took measures to preserve in their new home the textile arts brought with them from the mother country; and in 1646, as we have seen, Virginia established at Jamestown two spinning-houses, 40 by 20 feet, with the necessary implements and teachers to instruct two children from each county. Nine years later about 20 persons in Boston agreed to contribute for "a house and materials to improve the children and youth, who want employment, in several manufactures."[122] Such schools later were established by county authorities in Maryland and probably in Virginia. In 1720 a town committee in Boston recommended that a house should be hired, and teachers and 20 spinning-wheels provided, to instruct children in spinning flax, and the following year a wealthy and public-spirited merchant of that city erected a building for that purpose. This building was bequeathed by him to the city ten years later, when it was known as "the spinning school house."[123] In 1734 New York erected a poor house upon the common, which was provided with implements of industry, including four spinning-wheels, for the employment of the occupants;[124] and between 1739 and 1746 the Philadelphia workhouse advertised for sale cordage, bagging, colored thread, and dyed linen, all of which were manufactured by the inmates.[125] In 1750 there was a linen manufactory in Boston, conducted by a society, which occupied a building in the public common and employed several looms. As this society and the Philadelphia workhouse both advertised for yarn,[126] it is not improbable that their capital was employed chiefly

[122] John Hull, *Diaries*, 178, quoted in Weeden, *Economic and Social History of New England*, 1, 196.
[123] Bagnall, *Textile Industries*, 18–19.
[124] Bishop, *History of American Manufactures*, 1, 334.
[125] Advertisements, *Pennsylvania Gazette*, June 7 and 11, 1739; Feb. 11, 1745.
[126] Advertisements, *Pennsylvania Gazette*, Feb. 11, 1745; *Boston Newsletter*, Dec. 13, 1750.

in weaving, which would afford encouragement to spinning by the market thus offered; and in fact the Boston society was willing to teach children gratis to operate its wheels. Soon after that date, probably in 1751, this society was succeeded by the "Society for Encouraging Industry and Employing the Poor," already mentioned in another connection. The Manufactory House, the finest building for industrial use hitherto erected in America, was built, and remained for fifty years one of the more important edifices of the city. About the same time Charlestown voted to turn its old town-house into a spinning-school.

After the middle of the eighteenth century we hear less of the educational purpose of these enterprises, and more of their economic service. It would be difficult thereafter to differentiate between philanthropic and commercial motives in the public promotion of textile manufactures; but the idea was well fixed in the popular mind that the employment of children in such arts served the general welfare, and that the profit of their labor, even when unremunerated, properly belonged to the person who undertook the burden of their instruction. Before the introduction of labor-saving machinery this profit was less than it was subsequently, and instruction was relatively more expensive; therefore this attitude toward child employment was better justified at the period we are now describing than it was half a century later. However, from this point we may trace some labor features of the factory system, as well as a tendency to assemble the implements of manufacture in a single building.

Meanwhile, shop manufacturers were enlarging their business and employing more hands until their operations approached a factory basis. Some of these enterprises found a home in the Manufactory House. One of its tenants, from 1762 until 8 or 10 years later, was a linen-weaver by the name of John Brown, who may have employed a number of spinners, as he advertised to teach them gratis, and who, during the agitation against Great Britain, sold his goods to the principal ladies of the city.[127] He was required by the terms of his lease to keep four looms busy. In the same building about the same time was Adam Rupp, a stocking-maker, who employed "a number of stocking looms."[128] But the most important tenant was William Molineux, a member of the society under whose auspices the Manufactory House was built, who in 1769 opened a spinning-school or schools, with nearly 400 wheels, partly with public assistance; and in a petition to the legislature, the next year, stated that during the first season he had "learned at least 300 children and women to spin in the most compleat manner." In order to make a commercial success of the venture he had turned his thoughts "to manufacturing the children's labor into wearing apparel," and had erected warping

[127] Advertisement, *Boston Newsletter*, Jan. 24, 1765; Bagnall, *Textile Industries*, 37, 38, 39, 41, 46, 47, 48.

[128] Bagnall, *Textile Industries*, 40.

and twisting mills, looms, a furnace with hot and cold presses for finishing goods, and what was represented as the best-equipped dye-house in the country. With the warping and twisting mills two boys would keep more than fifty looms constantly at work. Molineux, who devoted himself chiefly or entirely to the wool manufacture advertised in 1769 that he had by him quite 40,000 skeins of fine yarn, and by the terms of his subsequent lease he was obliged to keep ten looms constantly employed in weaving worsted.[129] He died, however, before the expiration of the lease, and in 1774 the equipment just described was sold at auction to close his estate.[130] This may have been the nearest approach to a textile factory in the colonies prior to the Revolution, though in New York, in 1767, a linen manufactory was conducted by a private undertaker under the auspices of the Society of Arts of that city, which operated 14 looms and was reported to give employment to 300 poor persons.[131] The sailcloth manufactories at Boston and in Rhode Island, a half century earlier, a cotton factory in Philadelphia of which there is obscure mention in 1764,[132] which may have been the short-lived company referred to in Governor Penn's report two years later, and possibly other textile enterprises in the same city, complete the group of such undertakings of which we have even suggestive information.

During the hostilities with the mother country, and the period between the close of that struggle and the adoption of the Constitution, some further progress was made toward factory organization. The first and most important step in this direction was the establishment, in Market Street, of the United Company of Philadelphia, which manufactured cotton, linen, and woolens. The company installed a jenny of 24 spindles, and possibly other apparatus of the same kind, and is said to have employed nearly 500 people, most of whom were engaged in spinning at their homes. Probably the goods were woven at the manufactory.[133] When the company was revived, in 1787, immediate steps were taken to purchase machinery, and the following spring four jennies, carrying 224 spindles, and a carding machine were put in operation, besides 26 looms. Doubtless much spinning was still done at the homes of the operatives, though horse-power was used at the factory. There is record of nearly 12,000 yards of cloth manufactured by this company within something over six months of the installation of its machinery, a greater part of the fabrics being of flax or cotton.[134] In Philadelphia Samuel Wetherill occupied a position similar to that

[129] Massachusetts, *Archives*, LIX, 568–569; Bagnall, *Textile Industries*, 42, 47, 48.

[130] Advertisement, *Massachusetts Gazette*, Dec. 16, 1774.

[131] Governor Moore to Lords of Trade, Jan. 12, 1767, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VII, 888; Bagnall, *Textile Industries*, 53.

[132] *Complete Magazine*, quoted by Bagnall, *Textile Industries*, 51; Bishop, *History of American Manufactures*, I, 369, Note 2.

[133] *Pennsylvania Magazine*, 1775; *Pennsylvania Packet and General Advertiser*, Oct. 16, 1775, quoted in Bagnall, *Textile Industries*, 69, 70.

[134] Bagnall, *Textile Industries*, 78.

of William Molineux at Boston; he was a promoter and first chairman of the United Company, and at the same time or shortly afterwards an independent manufacturer, who made woolen cloth for the Revolutionary army and during the later years of the war conducted a manufactory between Market and Arch streets.[135] At Baltimore Edwin Parker erected a building for linen manufacturing, and during the Revolution kept five looms employed, receiving public assistance for this purpose.[136] There was a linen factory at Georgetown; Charles Carroll of Carrollton conducted at his plantation a manufactory of coarse woolens and linen;[137] several small enterprises of a like character were started in Virginia;[138] and at Charleston Daniel Haywood had a similar establishment in which he made 6,000 yards of good cloth annually.[139] The Carroll factory was possibly not more than an enlargement of the plantation loom-house, where slaves and indentured servants spun and wove negro cloth and coarse homespun under the oversight and instruction of a skilled overseer. Before the outbreak of hostilities a Baltimore merchant was commissioning skilled spinners from Ireland.[140] South of Charleston one planter was reported, in 1777, to be making 120 yards of cotton and wool mixed goods every week, employing 30 negroes under the oversight of a white woman and one male weaver.[141] From these plantation manufactories developed the small jenny mills, of which one or two in South Carolina may have been operated by water-power before Slater installed the first successful Arkwright machinery in Rhode Island. Before the adoption of the Constitution, jennies, following their first use in Philadelphia, were introduced also in New England for the manufacture of cotton and sailcloth, and the history of their use in spinning cotton and flax sums up the short mechanical transition from the manufactory to the early mill-factories of Rhode Island and the neighboring States.

The first jenny cotton factory, after the one at Philadelphia, of which we have positive record, went into operation at Beverly, Massachusetts, in 1787, with a carding-machine and four jennies, together with eleven spring-shuttle looms and various machines for preparing the warp and reeling. Two years later 10 jennies with 636 spindles were in operation. The number of spindles was larger than in Slater's first mill, but on account of the different system they had a smaller output. Horse-power was used, probably to run the cylinder card and the jennies. The rovings were made on an ordinary foot-wheel.

[135] Bagnall, *Textile Industries*, 72.
[136] Johnston, *History of Cecil County*, 324, 325.
[137] Advertisements, *Maryland Journal and Baltimore Advertiser*, Dec. 9, 1777; Oct. 27, 1778; quoted in Bagnall, *Textile Industries*, 80; Griffith, *Annals of Baltimore*, 80.
[138] *Documentary History of American Industrial Society*, II, 315, 316, 326, 327.
[139] Letter of Daniel Haywood to Thomas Haywood, Feb. 19, 1777, in South Carolina Historical Society Library.
[140] Woolsey and Salmon, *Manuscript Letter Book*, June 24 and Dec. 8, 1775.
[141] *South Carolina and American General Gazette*, Jan. 30, 1777; *cf.* also *Boston Chronicle*, Dec. 5, 12, 1768, quoted in *Documentary History of American Industrial Society*, II, 274.

Another factory, with similar machinery but probably on a smaller scale, was established at Worcester in 1789; and the same year a manufactory, possibly not using jennies, was started by the Baltimore Manufacturing Company, and another was at least projected at Wilmington. Meanwhile the New York Manufacturing Society opened a workshop, in which were a carding-machine and two jennies, and employed altogether 130 spinners and 14 weavers. Jennies continued to be used to spin wool and to spin flax for sailcloth, but in the more rapidly organized and centralized cotton manufacture they were displaced almost immediately by Arkwright machinery.[142]

The successful introduction of the latter improvement was the first permanent step toward a factory system in America, though that system was not fully established until some decades later. Moreover the initiative in organizing industrial enterprises of this character was not left entirely to public-spirited societies like those just described, nor to manufacturing artisans like Molineux, Hewson, and Wetherill. From a very early date it was customary for merchants to receive yarn and homespun in barter for merchandise. There is evidence that toward the close of the colonial period this custom was extending, that in some localities peddlers made a practice of collecting these articles from the country people and introducing them into general commerce, and that merchants gave out tasks of flax and wool to be spun and woven by their customers either in return for goods or for cash pay. It was from a Rhode Island merchant engaged in making coarse cloth for southern slaves that Samuel Slater received financial support to erect the first cotton mill in America. It is an interesting fact that in New England capital to establish manufactures on this system came from commercial sources; in Pennsylvania it was accumulated by artisan manufactures, and in the South the first textile mills were built by planters. Money flowed into manufactures from the dominant industry of each region, but the efficiency of its control and organization depended on the training afforded by that dominant industry for this new field of venture.

However, the colonial period did not witness the later stages of this development, though in some manufactories labor and tools were already specialized and a considerable number of workers coöperated in a continuous process of production. At the time of the Revolution a complete gunshop was expected to contain three or four barrel-forges, a water mill for grinding and polishing barrels, a lock-shop with seven forges and benches for forty filers, ten benches for gun-stock-makers, a brass foundry for mountings with several finishing benches, a couple of forges for bayonets and ramrods, together with a mill for grinding and polishing them, another forge for fittings, and

[142] See p. 425–426, *f.*

an assembling shop.[143] The manufacture of duck, which always served a commercial market and had existed in New England three quarters of a century prior to the outbreak of the Revolution, soon after the war engaged the attention of companies organized to conduct this business on a scale of some magnitude. In other lines of manufacture there was the same disposition to bring together in one establishment a number of special operations and to knit them into a continuous and reciprocally adjusted process. There were early symptoms of a stage of industrial advancement that made the factory system possible. It is idle to speculate what weight each influence cited may have had in shaping in the minds of our ancestors the concept of a factory and in hastening its concrete realization. The employment of child labor doubtless was suggested and supported by the example of the spinning-schools, though not due to this alone; the store system was a natural evolution from the relation of the merchant employer to his spinners and weavers, as well as a part of the mill and furnace organization long since established in the colonies; the manufacturing artisan, often trained in foreign manufactories, was becoming increasingly familiar with the economy of specialized processes and division of labor; water mills were improved to the point where they suggested the form of material plant; and industrial societies organized for public objects suggested and predicted the modern manufacturing corporation.

[143] Pennsylvania, *Archives*, Ser. I, vol. IV, 767–768; Bruce, *The Rise of the Iron Industry in Virginia*, Chap. I.

CHAPTER IX

REVIEW OF CONTEMPORARY ACCOUNTS OF COLONIAL MANUFACTURES

Sources of information, 194. Manufactures before 1721, p. 195. Report of 1721, p. 200. Report of 1733, p. 202. Manufactures during the later colonial wars, 205. Manufactures at the close of the colonial wars, 207.

SOURCES OF INFORMATION

The volume of colonial manufactures can not be measured accurately, because at that time no industrial statistics were gathered, nor could the extent of homespun and dispersed rural manufactures well have been expressed in other than conjectural figures. Contemporary accounts of these industries, whether private or official, were descriptive rather than statistical. They were seldom based on special investigations, but rather represented facts of common knowledge. As a rule they were not founded upon broad enough observation of different localities and classes of people to carry complete authority. They contain many apparent contradictions, due sometimes to different conceptions of what constituted manufactures, sometimes to faulty information or to the assumption that what was true of a single locality was true of an entire province, and sometimes to the difficulty experienced by Europeans newly arrived from older countries in appraising conditions in new communities.

The earliest accounts of the colonies were written to encourage settlement, and therefore were tinged with a promoter's optimism. Most formal descriptions of America during the seventeenth century were of this character. From 1700, when the British Government began consciously to discourage American manufactures, until the Revolution, the reports upon colonial affairs made by royal officials to the Board of Trade constitute our principal source of industrial information. While sometimes alarmist, and sometimes disparaging, according to the temperament of the writer and the form taken by his solicitude to win favor with political superiors, these documents generally err more from limited information than from lack of candor. The political propaganda of home industries that followed the Stamp Act occasioned a new, though neither copious nor explicit, literature upon domestic manufactures. This consisted mainly of press items, and was characterized by a tendency to overstatement. This disposition to exaggerate continued from 1765 until 1791, when with Alexander Hamilton's *Report on Manufactures*, and later with the census of 1810, we enter the period of comparatively accurate and unbiased testimony.

Among allowances to be made in considering official reports upon colonial industries is the fact that the term "manufactures" is applied

particularly to textile industries, especially to making woolen cloth, to the partial or total neglect of primary manufactures and of such secondary manufactures as competed less directly with those of England. Moreover, these reports are most explicit and copious from the royal colonies, especially from New York, which was a commercial rather than an industrial province, while the proprietary colony of Pennsylvania and the New England governments, which were more largely industrial, either evaded making such reports or made them incompletely.

MANUFACTURES BEFORE 1721

Writing of New England before 1650, a resident noted that boots and shoes were exported occasionally to England, and that Boston employed skilled craftsmen in many other manufacturing trades besides those mechanics—such as carpenters and joiners—that are of necessity required in growing towns.[1] Though most of these artisans probably were engaged in custom-work and repairing, they may have employed occasional idle time to manufacture ahead of orders; all had been reared in Great Britain and retained the craft immobility of an old community; therefore they were not attracted so readily from the workshop to the farm as were their descendants of the next generation.

Conditions in Philadelphia were similar immediately after the settlement of the city, if we are to believe the enthusiastic accounts of Thomas. That writer enumerated, among manufacturing artisans actually employed in Pennsylvania, shoemakers, wool-combers, potters, tanners, curriers, brickmakers, coopers, feltmakers, brewers, silversmiths, lastmakers, and heelmakers, besides a long list of other tradesmen who are not so specifically stated to follow in America their regular occupations.[2]

An account of Virginia published in 1649 mentions "an old planter of over 30 years' standing" who "sows yearly store of hemp and flax, and causes it to be spun; he keeps weavers and hath a tan house, causes leather to be dressed, hath 8 shoemakers employed in their trade, hath 40 negro servants, brings them up to trades in his house."[3] This description of Virginia informs us further that the settlers had 3,000 sheep and produced much flax and hemp; that iron ore was abundant; that the colony maintained six public brewing-houses and nine gristmills, four of which were driven by wind and five by water, though it had no sawmill, which was much needed. Pitch and tar were manufactured. Also many prosperous mechanics followed their trades as turners, potters, coopers, sawyers, carpenters, tilemakers, boatwrights, bakers, shoemakers, and tanners.

Prior to 1650 the people of the colonies were transplanted Europeans; after that date they were—except in Pennsylvania—for the most part

[1] Johnson, *Wonder-Working Providence*, III, Chap. VI, 248.
[2] *Cf.* 164, preceding.
[3] *A Perfect Description of Virginia*, in *Force, Tracts*, II, 8, p. 15.

American-born. This was peculiarly true of New England, which received few settlers from the mother country during the latter half of the seventeenth century. Consequently the direct contact of the mass of the people with European industry through youthful association or apprenticeship ceased. As previously mentioned, some branches of craftsmanship may have declined for this reason. More potent than this, however, in shaping the industrial tendencies of the next half century, was the experimental knowledge which the colonists had acquired of their own immediate interests. Tobacco-planting in Virginia and Maryland, lumbering, fishing, and ship-building in the northern colonies, absorbed an increasing proportion of the industrial energy of the people. It may be doubted whether during this period general manufactures held their own even in New England. Certainly no development occurred important enough to leave a record, though scattered data indicate the persistance of the homespun and neighborhood crafts that were an essential part of colonial household and village economy. In 1676 Edward Randolph wrote that in Massachusetts "all mechanical arts and occupations thrive very well." The colonists made iron as good as the Spanish, had at one time cast their own cannon, and manufactured at Dorchester powder "as good and strong as the best English powder."[4]

Another informant noted 12 ships built annually, adding:

"As to cloth, there are made there Linsey Woolseys, and other of cotton and wool, and some all sheep's wool, but the better sort of linen is brought from England; they have many wool-combers, and some make Tammyes, but for their private use."[5]

An account of New England published in 1689 states that "Some manufactures there are among them, but not a twentieth part of what the country hath need of, or is consumed there. Most of their clothing, as to woolen and linen, all sorts of upholstery wares, haberdashers and silk wares, stuffs, silks, etc., they have from England."[6] But the same year a Massachusetts merchant, who was trying to secure a concession to manufacture naval stores for the British Government, wrote:

"The importation of goods into that plantation being more than they from amongst themselves can produce returns for, hath for some years past very much abated their consumption of the English manufactures and put them into the necessity of running into the practice of the manufactures of England, in which they have already proceeded so far that most of the country people are supplied with the produce of their own land."[7]

[4] Randolph, "Present State of New England," British Museum, *Additional Manuscripts*, 28089, *f.* 6, in *British Transcripts*, Library of Congress, 3.

[5] Great Britain, *Calendar of State Papers, America and West Indies*, 1675–1676, 220–222, Apr. 29, 1675.

[6] Mather, "Brief Relation of the State of New England," in *Force, Tracts*, IV, 2, p. 8.

[7] "Some Considerations concerning Naval Stores," by Colonel Charles Lidgett, Merchant of New England, Public Record Office, *Colonial Office Papers*, class 5, No. 859, *f.* 76.

The following year, in support of a similar proposal, a company of petitioners stated:

"At present and for some years last past the sole trade of that city [Boston] is and has been carried on by a few persons, who have raised the prices of the English manufactures to so great a rate that the common people there are not able to purchase them, and have of late diverted themselves from husbandry (their usual employment) and applied themselves to the making of cloth, serge, stuffs and other manufactures of England, in which they have already made a considerable progress."[8]

In reply to this petition, it was stated that "the people of New England are dayly supplied by private hands with more commodities than the city can vend,"[9] an observation that obviously questioned the reason just given for the prosperity of domestic industries rather than the fact of their existence.

According to the statements of Thomas and Pastorius, who were the first to describe the English settlements along the Delaware River, Pennsylvania and New Jersey had commercial manufactures of linen and woolen before the end of the seventeenth century. A petition of the government and council of Virginia, in 1692, stated that many planters had begun "improving and making several commodities and manufactures usually brought to them from England."[10] On the other hand, Beverley, writing about the same time, gave a most unfavorable view of the industrial economy of the province:

"They have their clothing of all sorts from England, as linen, woolen and silk, hats and leather. Yet flax and hemp grow nowhere in the world better than there. Their sheep yield good increase and bear good fleeces: but they shear them only to cool them. The mulberry tree, whose leaf is the proper food of the silkworm, grows there like a weed, and silkworms have been observed to thrive extremely and without hazard. The very furs that their hats are made of perhaps go first from thence; and most of their hides lie and rot, or are made use of only for covering dry goods in a leaky house. Indeed, some few hides with much ado are tanned and made into servants' shoes, but at so careless a rate that the planters don't care to buy them if they can get others; and sometimes perhaps a better manager than ordinary will vouchsafe to make a pair of breeches of deer skin. Nay they are such abominable ill husbands, that though their country be overrun with wood yet they have all their wooden ware from England; their cabinets, chairs, tables, stools, chests, boxes, cart wheels and all other things, even so much as their bowls and birchen brooms, to the eternal reproach of their laziness."[11]

We may question whether this statement is not overcolored; for in 1710, only five years after its publication, Lieutenant-Governor

[8] "Memorial of some Hundreds of Gentlemen, Merchants, Traders and others, Subscribers towards the working of Copper Mines and producing Naval Stores in New England," Public Record Office, *Colonial Office Papers*, class 5, No. 907, *f.* 241.

[9] "Reply to Proposals for a Company to work Mines, etc.," by Sir Henry Ashhurst, Agent for Massachusetts, Oct. 8, 1697, Public Record Office, *Colonial Office Papers*, class 5, No. 907, *f.* 305.

[10] "Petition for Encouraging Importation to prevent the Growth of Manufactures," June 22, 1692, in Virginia, *State Papers*, I, 38–39.

[11] Beverley, *History of Virginia*, 239.

Spottswood reported to the British Government that the planters had been forced by low prices for their tobacco into a "humor of planting cotton and sowing flax, and by mixing the first with their wool to supply the want of coarse clothing and linen, not only for their negroes but for many of the poorer sort of housekeepers." "This has now become so universal," he continues, "that even in one of the best counties for tobacco, I am credibly informed there has been made in this last year above 40,000 yards of divers sorts of woolen, cotton, and linen cloth."[12]

This is corroborated by William Byrd's description of the country along the southern Virginia border and by his private correspondence, which contain frequent allusions to spinning and weaving.[13] In 1715 Secretary Stanhope, of the Board of Trade, surmised that Maryland and Virginia "may be capable in time of subsisting without any supplies from Great Britain."[14] Governor Johnson, of South Carolina, had reported in 1708 that some planters in that colony made for their own use "a few stuffs of silk and cotton, and a sort of cloth of cotton and wool of their own growth to clothe their slaves."[15]

A description of the province of New York, published in 1670, stated of the inhabitants:

> "Likewise they sow store of flax, which they make every one cloth for their own wearing, as also woolen cloth, and linsey-woolsey; and had they more tradesmen amongst them, they would in a little time live without the help of any other country for their clothing: for tradesmen there is none but live happily there, as carpenters, blacksmiths, masons, tailors, weavers, shoemakers, tanners, brickmakers, and so any other trade."[16]

In 1705 Lord Cornbury informed the British authorities that "upon Long Island and Connecticut they are setting up a woolen manufacture, and I myself have seen serge made upon Long Island that any man may wear. Now if they begin to make serge, they will in time make coarse cloth, and then fine."[17] Three years later the same governor reported:

> "Manufactures settled in this Province [New York] are linen and woolen; they make very good linen for common use and I don't doubt but in time they will improve that considerably. As for woolen, I think they have brought that to too great perfection already. * * * They already make very good serges, linsey-woolseys, and in some places they begin to make coarse cloth, and without doubt

[12] Governor Spottswood to Council of Trade, Mar. 20, 1710, in Virginia Historical Society, *Collections*, I, 72, 73, 74; also *Documentary History of American Industrial Society*, I, 187.

[13] Byrd, "Dividing Line," 41, 56, and "Progress to the Mines," 334, in *Writings*.

[14] Lord Stanhope to the Lords of Trade, Feb. 1715, in New Jersey, *Archives*, Ser. I, vol. IV, 348.

[15] Governor Johnson to Lords of Trade, Sept. 17, 1708, quoted in McCrady, *History of South Carolina under the Proprietary Government*, 479.

[16] Denton, *A Brief Description of New York*, 18.

[17] Lord Cornbury to Secretary Hedges, 1705, in O'Callaghan, *Documents Relative to the Colonial History of New York*, IV, 1151; also in O'Callaghan, *Documentary History of New York*, I, 485.

in a short time they will so far improve in that as not to want the assistance of England to clothe themselves."[18]

The same year another informant wrote from New York to the Board of Trade:

"They are already so far advanced on their manufactures that 3/4 of the linen and woolen they use is made amongst them especially of the coarser sort, and if some speedy and effectual ways are not found to put a stop to it, they will carry it on a great deal further, and perhaps in time very much to the prejudice of our manufactures at home. I have been discoursed with by some to assist them in setting up a manufactory of fine stuffs; but I have for the present put it by, and will for my own part never be concerned in it nor any thing of that nature, but use all the little interest and skill I have to prevent it."[19]

The same date a Massachusetts official observed of that colony: "Country people and planters have entered so far into making their own woolens, that not one in forty but wears his own carding, spinning, etc.;"[20] and the following year Governor Dudley reported that the woolen trade with England had abated greatly and that the people were clothing themselves with their own wool.[21] In 1715 Governor Hunter confirmed the earlier estimate of the proportion of homespun used in New York, so far as it applied to "the planters and poorer sort of country people," stating that the computation "is rather less than more, but the several sorts are coarser than what come from England." He added that he has never known homespun to be sold in the shops, and that "the people of New York and Albany, which make a great part of the Province, wear no clothing of their own manufacturing."[22] The combined population of these two towns was probably at that time less than one-fourth the total population of the colony.[23] Five years later the same governor, in reply to a query from the home authorities, mentioned flour, tar, whale oil, and pork among New York's products, but "no sort of manufacture that deserves mentioning," from which we may infer that commercial texile manufactures alone were meant.[24]

The early years of the eighteenth century witnessed the continued activity of homespun manufactures in Massachusetts. An account of

[18] Lord Cornbury to Lords of Trade, July 1, 1708, in O'Callaghan, *Documents Relative to the Colonial History of New York*, v, 59.

[19] Caleb Heathcote to Lords of Trade, Aug. 3, 1708, in O'Callaghan, *Documents Relative to the Colonial History of New York*, v, 63.

[20] John Bridger to Lords of Trade, Board of Trade New England, S. 46, quoted in Palfrey, *History of New England*, III, 369; Lord, *Industrial Experiments in the British Colonies*, 131.

[21] Lord, *Industrial Experiments in the British Colonies*, 132.

[22] Governor Hunter to Lords of Trade, Nov. 12, 1715, in O'Callaghan, *Documents Relative to the Colonial History of New York*, v, 460; also in O'Callaghan, *Documentary History of New York*, I, 486.

[23] O'Callaghan, *Documentary History of New York*, III, 545; O'Callaghan, *Documents Relative to the Colonial History of New York*, VI, 471.

[24] Brigadier Hunter to Secretary Popple, Aug. 11, 1720, in O'Callaghan, *Documents Relative to the Colonial History of New York*, v, 556.

New England trade laid before Parliament, in 1715, by a Boston merchant, stated that "since the prices of English goods became so dear, nine years ago, this put the colonies on making buttons, stuffs, kerseys, linsey-woolsey, shalloons, flannels, etc., which has decreased the importation of those provinces above £50,000 [sterling] per annum."[25]

Four years later a British commissioner reported so great an increase of woolen manufactures in New England that scarcely a countryman came to Boston but clad in his own spinning, and public sentiment strongly supported the use of home-made goods in preference to British manufactures.[26] This was the period of the first spinning craze in Boston, an emotional revival of home industry, suggested in part by the arrival of a colony of skilled Irish spinners from Londonderry and partly by local economic conditions. In Boston people of all classes, rich and poor, flocked to the common, where spinning-wheels were set up in the open air; prizes were offered for the best work, and home-spun fabrics were for a time the fashion of society.[27] In 1720 the British customs offices in New Hampshire and Massachusetts reported that thousands of pounds' worth of homemade stuffs and druggets were sold in the Boston shops.[28] Yet almost the same year a letter to Parliament from New England asserted that the colonists' "delight is to wear English manufactures, but the difficulty of coming at them is very great. * * * They are forced to fall on woolen, linen, iron and leather manufactures."[29]

REPORT OF 1721[30]

In 1721 the Board of Trade prepared a formal report, presenting a résumé of information regarding colonial conditions gathered from correspondence with officials in America. New Hampshire manufactured lumber and turpentine, and had forged experimentally a little iron from local ores. Ship-building had declined since the war with France. Hemp and flax were mentioned as products not yet well established. Massachusetts, besides lumber and naval stores, produced "all sorts of common manufactures." The report continued:

"The inhabitants have always worked up their own wool into coarse cloths, druggets, and serges; but these, as well as their home-spun linen, which is generally

[25] Banister, *Discourse on the Trade of New England*, July 15, 1715; "Board of Trade Papers," New England, B. 91, quoted in Lord, *Industrial Experiments in the British Colonies*, 134; Bishop, *History of American Manufactures*, I, 330.

[26] John Bridger to Secretary Popple, "Board of Trade Papers," New England, W. 65, quoted in Lord, *Industrial Experiments in the British Colonies*, 133.

[27] Bagnall, *Textile Industries*, 18, 19.

[28] Lord, *Industrial Experiments in the British Colonies*, 136.

[29] Letter to a Member of Parliament concerning the Naval Stores Bill, 1720, quoted by Lord, *Industrial Experiments in the British Colonies*, 126.

[30] *Report on the State of the Colonies*, in British Museum, *King's Manuscripts*, 205, *British Transcripts*, Library of Congress, 23; *cf.* also "State of America," in British Museum, *Additional Manuscripts*, 23615; O'Callaghan, *Documents Relative to the Colonial History of New York*, V, 591–610.

half cotton, serve only for the use of the meanest sort of people. A great part of the leather used in the country is also manufactured among themselves; some hatters have lately set up their trade in the principal towns; and several Irish families, not long since arrived, and settled to the eastward, make good linen and diaper; however, the excessive price of labor enhances the value of all their manufactures."

The colony annually launched about 150 vessels, with an aggregate burthen of 6,000 tons, the greater part of which were built on account of British merchants. Iron for domestic use was manufactured, but English iron was esteemed better and was generally used for ship-work.

Rhode Island and Connecticut made no report; New York mentioned only an unsuccessful experiment of settling 2,227 Germans in the colony, for the purpose of making tar; New Jersey reported no manufactures, and the people of Pennsylvania, though they built ships and traded in lumber, were said otherwise to have "few or no manufactures of their own." The inhabitants of Maryland clothed themselves and their slaves with imported goods to the exclusion of home manufactures, and Virginia and the Carolinas reported only lumber and tar among their manufactured products.

Obviously the information contained in this report was so incomplete that omissions and negative statements had no force. The iron works of New Jersey and Pennsylvania were not mentioned; milling industries except lumber were overlooked; and in most colonies homespun and household manufactures were omitted.

In 1728, Sir William Keith, who at that time was residing in London, but recently had been governor of Pennsylvania and later a member of the provincial assembly, replied to inquiries of the Board of Trade regarding manufactures in America as follows:[31]

"I know of no Company or Society of men, that have actually engaged in any project for carrying on manufactories either of silk, linen, or woolen, but I have heard that some few experiments have been made both for raising silk and working hemp up into sail cloth, with a view, as I suppose, to induce people to enter into some projects of that nature. * * * None of the inhabitants to the southward of Pennsylvania (excepting one county called Sommerset upon the eastern shore of Maryland) have any temptation or ability to manufacture either wool or flax to advantage, for their people are so entirely employed upon tobacco and rice, that they can scarce afford time to raise corn enough to supply their families with bread; but the aforesaid county of Sommerset does at this time make a good deal of cloth, which may proceed partly from the soil not being so fit for tobacco, and partly from its being inhabited by people who have been educated and brought up to that sort of business in Ireland; but in Pennsylvania, New Jersey, New York, Connecticut, Rhode Island, New England, etc., it is otherways, and I conceive the following reasons may be assigned why these people have in some measure fallen into a minute or peddling manufacture of wool and linen cloth for the use of their own families.

[31] Sir William Keith to Lords of Trade, Nov. 27 and 28, 1728, in New Jersey, *Archives*, v, 203, 204, 205, 206.

"*1st.* Their principal product is stock and grain, and consequently their estates depend wholly upon good farming, and this can not be carried on without a certain proportion of sheep (which in a good pasture there, lamb twice a year and every ewe generally brings two and often three lambs at a time) so that the wool would be lost, if they did not employ their servants at odd times, and chiefly in the winter season to work it up for the use of their own families.

"*2nd.* An acre of flax which will produce from 1,000 to 1,500 hundredweight is easily raised, and coarse cloth made of it will do twice the service of cloth of the same fineness that comes from any part of Europe, which in like manner leads the industrious farmer to employ his intervals of time in making up small parcels of such coarse cloth for the use of his family, and likewise he often raises also a small quantity of hemp to make bags, plough traces, and halters for his own use, they being as said before, of a better quality for lasting than any that can be purchased in the shops.

"*3rd.* The old women and children, fit for no other business about a farmer's house, are made useful in carrying on a little manufacture for the service of the family, and by this means also every one is constantly employed within or without doors, let the weather or season be ever so bad.

"*4th.* Grain being the chief product by which they are enabled to purchase clothing and other European goods, those settlements which are back in the woods and far distant from navigation have not an opportunity of a market for grain, which will not bear the charge of a great land carriage, wherefore they raise no more corn in such places than what they consume themselves, by which means they can spare more time to work up as much wool and flax into cloth as they want for their own use."

REPORT OF 1733[32]

In 1733 the Board of Trade was instructed to prepare, during the recess of Parliament, "an account of the laws made, manufactures set up, and trade carried on, in any of His Majesty's colonies and plantations in America, which may have affected the trade, navigation and manufactures of this Kingdom; distinguishing when any such manufactures were first set up, what progress has been made therein, and what orders or instructions have been made to discourage the same." The report prepared in response to these instructions was based upon letters received from the colonial governors. These letters were not in all cases of recent date, or written with the particular purpose of the report in view. A previous report, made in 1728, was quoted, in which the above letter of Governor Keith, who had now been out of office for seven years, was extensively paraphrased; and other letters were referred to which were written prior to the report of 1721. An allusion to annual queries sent the governors implies that these related in part to the status of colonial industries; but if regular answers to these inquiries were received by the home government the topic of manufacturing seems often to have escaped attention. The Board mentioned the fact that—

[32] "State and Condition of the British Colonies in America," in British Museum, *Additional Manuscripts*, 33028, *f.* 246–275 (Newcastle Papers), *British Transcripts*, Library of Congress, 15; also Public Record Office, *Colonial Office Papers*, class 324, No. 12, in *British Transcripts*, Library of Congress.

"It is not at all improbable that some former governors of our colonies, who may in general be said to depend too much upon the assemblies of their respective provinces for the establishment of their salaries and other appointments, may, in breach of their instructions, have given their concurrence to laws, or have connived for many years at the practice of trades prejudicial to the interest of Great Britain, till the evils arising from them became too considerable to be any longer concealed."

Indeed some of the officials quoted in the report could have had very little sympathy with British inquisitiveness respecting colonial manufactures. Jonathan Belcher, who at this time was governor of Massachusetts and previously had been governor of New Hampshire, and who was quoted in regard to both provinces, was the son of a Boston merchant and engaged in manufacturing enterprises. At one time he was interested in the Simsbury copper mines, and erected a smelter at Boston for his ores, which he mentioned in letters to a correspondent in that city, when he was later governor of New Jersey. His official position did not prevent his writing:

"I am full in opinion with you and my other friends in New England that there is no wiser or better measure to go into for retrieving the miserable circumstances in your province than to promote manufactures among yourselves."

In advising his correspondent with regard to a proposed glass house, he said that it was difficult to get information from the New Jersey works, "in which the managers are very close"; but recommended that the promoters entice workmen and smuggle clay for their furnaces out of England, adding:

"Its exportation is prohibited upon great penalty, and yet my friends contrived to send me three or four hogsheads about 30 years ago, for the bottoms of my copper furnaces, and which bade defiance to the hottest fire; but it was a very chargeable thing to get."[33]

Therefore we must allow for the fact that the information which follows was incomplete, partly out of date, and possibly qualified in some cases by the interested reticence of officials in America.[34] Nevertheless the positive statements are valuable so far as they go; at least they need not be discounted for exaggeration. New Hampshire was presumed to make less woolen homespun than formerly because of the recent inclosing and cultivation of the common lands previously used for pasture; but "the manufacturing of flax into different kinds of linen was daily increased by a great resort of people from Ireland well skilled in the linen manufacture." The report from Massachusetts, after quoting the account of manufactures presented in 1721, cited Governor Belcher to the following effect:

[33] Governor Belcher to Colonel Alford, Aug. 24, 1752, in New Jersey, *Archives*, VIII, 109; *cf.* Trumbull, *History of Connecticut*, I, 40.

[34] *Cf.* Bishop, *History of American Manufactures*, I, 341; Lord, *Industrial Experiments in the British Colonies*, 137; Bagnall, *Textile Industries*, 16; Weeden, *Economic and Social History of New England*, II, 679; Massachusetts Historical Society, *Collections*, Ser. VI, vol. VI, 70–71, 489; VII, 149, 178, 192.

"There are some other manufactures carried on in New England, such as the making brown holland for women's wear, which lessens the importation of calicoes and some other sorts of India goods into that province; that there are likewise some small quantities of cloth made of linen and cotton for ordinary sheeting and shirting. That about three years ago a paper mill was set up which makes to the value of about two hundred pounds sterling per annum. And he hath since informed us that there hath lately been a new paper mill set up at Falmouth in Casco Bay which at that time had not begun to work for want of materials; that there are several forges for making of bar iron, and some furnaces for cast iron, or hollow ware; and one slitting mill, the undertaker whereof carries on the manufacture of nails. As to the woolen manufactures of this province Mr. Belcher says that the country people who used formerly to make most of their clothing of their own wool do not at present manufacture a third part of what is necessary for their own use but are generally clothed with English manufactures. We have likewise been informed by letters of older date from Mr. Belcher, in answer to our annual queries, that there are some few copper mines in this province; but so far distant from water carriage, and the ore so poor that it is not worth the digging. Col. Dunbar, Surveyor General of His Majesty's woods in North America, in his letter to us dated the 15th September, 1730, takes notice that the people of New England have an advantage over those of Great Britain in the drawback allowed for all India and other goods exported thither which pay a duty in Great Britain, but are subject to no duty of importation either in this province or any other of the plantations. He has likewise transmitted to this board several samples of edge tools made in New England, and in his letter to our Secretary dated the 4th of June, 1731, he says they have six furnaces and nineteen forges for making iron in New England. He also acquainted us in a former letter dated August 19th, 1730, that in this province many ships are built for the French and Spaniards, which are trucked with those people by connivance for rum, molasses, wines, and silks. And these informations have been in great measure confirmed by Mr. Jeremiah Dunbar, Deputy Surveyor of the Woods, and also by Mr. Thomas Coram, a person of reputation who resided many years in New England, to which they have added that great quantities of hats are made in that province,[35] of which the company of hatters of London have likewise complained to us, which gave birth to an act of Parliament that was passed in the last sessions upon this subject. We were further informed by the said Mr. Jeremiah Dunbar, that the people of New England export great quantities of hats of their own manufacture to Spain, Portugal and our West India Islands; that they make all sorts of iron works for shipping, and that there are several still houses and sugar bakers established in New England. But we can not conceal from your lordships that it is with the greatest difficulty we are able to procure true informations of the trade and manufactures of New England; which will not appear extraordinary when we acquaint your lordship, that the assembly of the Massachusetts Bay had the boldness to summon the above mentioned Mr. Jeremiah Dunbar before them and pass a severe censure upon him, for having given evidence at the bar of the House of Commons of Great Britain with respect to the trade and manufactures of this province agreeable to the tenor of what is above mentioned under his name."

Brief reports from Connecticut and Rhode Island referred to no manufactures except tanning, shoemaking, and in the latter colony

[35] Thomas Coram, *Petition to the Board of Trade*, 1732, in New Jersey, *Archives*, v, 309.

to iron mines, "that do not afford a fourth part of the iron that is requisite for the use of the inhabitants." New York reported no manufactures, New Jersey failed to reply to the inquiries addressed its government—though the Company of Hatters in London complained of great quantities of hats manufactured in that province—and Pennsylvania claimed not to export any woolen or linen manufactures, though it made coarse cloth for home consumption. The poorer planters of Maryland and Virginia made some woolen and linen homespun for their own use only. The latter colony had a recently established pottery and four furnaces making pig-iron for the British market. However, Virginia and her sister provinces imported from New England workshops "not only scrutores, chairs and other wooden manufactures, but hoes, axes, and other iron utensils." Carolina reported some manufactures of "hats, shoes, and coarse mixed cloth made of cotton and wool, for the use of their negroes."

MANUFACTURES DURING THE LATER COLONIAL WARS

During the thirty years following this report the colonies were involved in colonial wars, which afforded opportunities for freer commerce than existed in times of peace. Money circulated more abundantly, and imported merchandise found its way to colonial markets through less obstructed channels. This was a period of commercial rather than industrial expansion.[36] Yet if the growing opulence of the older settlements and the port towns encouraged more liberal use of foreign merchandise, the ever-extending frontier increased the population of homespun-clad pioneers. The correspondence of the governors contained frequent allusions to the rustic manufactures of the colonists, generally apologetic or disparaging in tone, and adding nothing to the information previously presented. In 1749 Governor Clinton, of New York, embodied in a report to the Lords of Trade the substance of a communication from the collector of port, dated three years earlier, which stated that, in addition to their customary manufacture of homespun for country wear, the people of the province made hats and lampblack, and for some 34 years had manufactured linseed oil. Since 1730 they had refined sugar for shipment to Europe and the West Indies. Six rum distilleries, three of which had been erected within four years, also testified to the activity of commerce with the southern islands; and an iron furnace was in operation.[37]

We get a more vivid impression of the state of manufactures in the middle of the eighteenth century from writers like Douglass, and travelers like Kalm and Burnaby, whose passing observations, in de-

[36] *Cf.* Bishop, *History of American Manufactures*, I, 344; Weeden, *Economic and Social History of New England*, II, 678–679.

[37] Governor Clinton to Board of Trade, May 23, 1749, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VI, 511; *cf.* also *id.*, 127, 393.

fault of statistics, were as accurate as those of royal officials. Douglass, who speaks most authoritatively of New England, remarked the decline of ship-building in Massachusetts, the number of vessels on the Boston stocks having fallen from 41, with a total burthen of 6,324 tons, in 1738, to 15 vessels, with a burthen of 2,450 tons, in 1749. Rum-distilling was prospering and hats were exported to all the colonies. Iron manufactures appeared to him important enough for a detailed description, in which he distinguished smelting furnaces, for running pigs from rock ore, some of which had been converted into remelting furnaces for castings; other furnaces, that made hollow ware directly from swamp ore; bloomeries for forging ore directly into bars, though such bars were inferior to those reduced from pigs; and refineries, "which manufacture pigs imported from New York, Pennsylvania, and Maryland furnaces, into bar iron."[38]

Kalm's references to manufactures have already been quoted in other connections. In 1748 he described Germantown, Pennsylvania, as a place where "most of the inhabitants are manufacturers, and make almost everything in such quantity and perfection, that in a short time this province will want very little from England, its mother country."[39] Ten years later Burnaby confirmed this:

> "The manufactures are very considerable. The Germantown thread stockings are in high estimation; and the year before last, I have been credibly informed, there were manufactured in that town alone above 60,000 dozen pair. Their common retail price is a dollar a pair. The Irish settlers make very good linens. Some woolens have also been fabricated, but not, I believe, to any amount. They have several other manufactures, viz. beaver hats, which are superior in goodness to any in Europe, cordage, linseed oil, starch, myrtle wax, spermaceti candles, soap, earthen ware, and other commodities."[40]

At another place Burnaby emphasized the fact that the manufactures of New York were "not extensive, nor by any means to be compared with those of Pennsylvania."[41] In 1750 Douglass estimated that the people of Pennsylvania manufactured nine-tenths of all their wearing apparel.[42]

Shortly after the middle of the century Massachusetts experienced a renewal of interest in household spinning and weaving similar to the spinning craze of thirty years earlier. At the celebration of the anniversary of the Boston Society for Encouraging Industry and Employing the Poor, in 1753, a weaver operating his loom was carried on a float, presaging the numerous processions having this or similar features that were to occur later in the century.[43] However, Governor Wentworth's report on New Hampshire, in 1754, stated that the manufac-

[38] Douglass, *British Settlements in North America*, I, 539, 540, 541.
[39] Kalm, *Travels into North America*, I, 70.
[40] Burnaby, *Travels*, 93; *cf.* also Hamilton, *Itinerarium*, 12.
[41] Burnaby, *Travels*, 115.
[42] Douglass, *British Settlements in North America*, II, 331–332.
[43] Bagnall, *Textile Industries*, 35.

tures of that province still were inconsiderable and not likely ever to affect those of Great Britain. He mentioned the making of stockings and mittens as though these might be an article of petty commerce. Londonderry still received chief comment as a seat of linen manufactures.[44] The repeated references to this town, the annual value of whose linens about this time was estimated to range from $12,000 to $16,000, of itself indicates the modest extent of commercial textile manufactures in that province.[45]

MANUFACTURES AT THE CLOSE OF THE COLONIAL WARS

Partly as a result of the effort made by the colonists, at the time of the Stamp Act, to free themselves from dependence on Great Britain for manufactured goods, the Lords of Trade, on August 1, 1766, addressed a letter to all the colonial governors requiring an account of the manufactures set up in their respective jurisdictions since 1734, and directing them to report annually thereafter any manufactures established in the colonies, or public encouragement given such industries. A second copy of this circular was sent to the governors in February 1768, with a renewed and stronger injunction to furnish the information therein required.[46] In response to these instructions Governor Wentworth reported that New Hampshire annually manufactured from native flax 25,000 yards of linen, which found its way into local markets. On account of its superior durability it sold freely for 37 cents a yard, which was 20 to 40 per cent higher than the price of imported linen. Only native wool was manufactured, and that exclusively in farmers' families. A flock of 50 sheep was considered large, and probably no single owner had over 100. Nearly enough saddles were made to supply the home demand. Local mechanics made ironwork for ships and farm implements. The governor added:

"The people are by no means inclined to any sort of manufacture. Scarcely a shoemaker, a joiner, or silversmith but quits his trade, as soon as he can get able to buy a little tract of land and build a cottage in the wilderness, which disposition I am industrious to cultivate and encourage as the most effectual means to prevent any schemes of manufacture taking place."

Governor Bernard of Massachusetts had reported, in 1763:

"The inhabitants of the trading towns, men, women, and children, have their whole supply of clothing from Great Britain. Most of the women in all other towns have the principal part of their clothing of British manufacture; the men have more or less. The poor laboring people in the country towns wear their common clothes principally of coarse homespun linens and woolens. Shoes are to be excepted, the men's being generally made here, the women's partly only.

[44] British Museum, *King's Manuscripts*, 205, *f.* 435, in *British Transcripts*, Library of Congress, 23.

[45] *Some Observations Relating to the Province of Massachusetts Bay*, 18.

[46] This correspondence is in British Museum, *King's Manuscripts*, 205, in *British Transcripts*, Library of Congress, 23.

Most of the furniture of the houses in the trading towns is of British manufacture. Nails, glass, lead, locks, hinges, and many other materials for houses are wholly imported from Great Britain. Canvas, cordage, ship chandlery wares for vessels, and in general such manufactures as are exported to the plantations are consumed here, and by the best information I can get the consumption increases rather than decreases."

In reply to the subsequent inquiries of the Board of Trade, in 1766 and 1768, Governor Bernard recounted several older manufacturing projects: the building of the Manufactory House in Boston in 1753, which was reported a failure; the undertakings of the German Protestants at Germantown, in the town of Quincy, whose glass works had failed and whose stocking-factory was not flourishing; and the paper mill at Milton. In Boston ship-building was a declining industry on account of exorbitant wages, carpenters demanding 67 cents a day. A later letter added of the colony's manufactures: "I do not think it necessary to send an annual account where I have nothing to inform of."

The governor of Rhode Island limited his enumerations of local manufactures to "ten forges for making iron out of ore, two furnaces, one for making ore into pigs and the other for making hollow ware out of ore, six spermaceti works, twelve pot-ash works, three rope-walks, and one paper-mill, at which is manufactured wrapping, package and other coarse paper."[47] The report from Connecticut contained a passing allusion to homespun linen and woolen, and mentioned also one pig-iron furnace, a number of refining forges, and one steel furnace, "but not sufficient to supply the inhabitants with that article." In addition there were in several towns "small buildings erected for the manufacturing of ashes for making potash, and this by ashes almost entirely collected from the house hearths." A paper mill was erected between 1766 and 1768.

The council of New York declared in 1766 that no manufactures had been set up in that province since 1734, nor was there any manufacturing of woolen cloth, "but what was principally confined to private families, for their own particular consumption." The following year Governor Moore reported a small linen factory in New York, employing 14 looms, and supported in part by public subscription in order to give work to the poor. There was no established manufacture of broadcloths, and some Yorkshire weavers who had arrived recently, expecting to find employment in this industry, had been disappointed. Probably rumors of colonial textile enterprises had spread among English weavers during the non-importation agitation the previous year, and induced a few to emigrate to America. However, Governor Moore added:

"There is a general manufactory of woolen carried on here, and consists of two sorts, the first a coarse cloth entirely woolen 3/4 of a yard wide; and an-

[47] Broadcloths and worsteds were made in Rhode Island; Hazard, *Thomas Hazard*, 95–103. For iron works, see Weeden, *Early Rhode Island*, 330–331.

other stuff which they call linsey woolsey. The warp of this is linen and the woof woolen, and a very small quantity of it is ever sent to market. * * * The custom of making these coarse cloths prevails in private families throughout the whole province, and almost in every house a sufficient quantity is manufactured for the use of the family, without the least design of sending any of it to market. This I had the opportunity of seeing in the late tour that I made, and had the same accounts given me by all those persons of whom I made inquiry; for every house swarms with children, who are set to work as soon as they are able to spin and card, and as every family is furnished with a loom, the itinerant weavers who travel about the country put the finishing hand to the work."

Hat-making flourished in New York City, though the hats were poorer and much dearer than those of England; a glass house had failed for want of skilled and reliable workmen; a small hollow ware furnace and a paper mill were in operation; and tanning was an extensive industry, though the leather was poor and no sole leather was manufactured. William Franklin reported that New Jersey had 8 blast furnaces for making pig-iron, and 42 forges for refining iron, which latter may include bloomeries. He mentioned also one slitting mill, one plating mill, and one steel furnace. A glass house erected in Salem County 20 years previously manufactured bottles and coarse green window glass.

Deputy Governor Penn, of Pennsylvania, mentioned a small linen factory, similar to the one in New York, which ceased operation soon after its establishment, and Baron Stiegel's glass factory near Lancaster, which was languishing from lack of market for its products. Maryland reported homespun weaving, which was encouraged by occasional bounties, and four rope-walks. Iron works and ship-building completed an enumeration of the colony's manufactures. In Virginia, besides blast furnaces, plantation mechanics manufactured iron into axes, hoes, and plowshares for home use. Ordinary plantation shoes were made, and country gentlemen preferred the "really fine" beaver hats of the local makers to those imported. "The planters' wives spin the cotton of this country, and make a coarse strong cloth with which they make gowns for themselves and children; and sometimes they come to this town and offer some for sale. Of this cotton they make coverlids for beds, which are in pretty general use through the colony."

In another letter Governor Fauquier remarked that no merchant would know where to purchase 100 yards of homespun cotton or linen if he had a sale for it. Governor Tryon, of North Carolina, casually alluded to household spinning and weaving, especially in the back settlements. He considered lumbering the only industry worthy of extended mention, and devoted some space to commending yellow pine as a building timber, stating that it sold for one-fourth more than northern pine in the West Indian market. The colony's mills annually

sawed between 8,000,000 and 9,000,000 feet of lumber. The people of South Carolina, according to Lieutenant-Governor Bull, imported yearly from England 500,000 yards of Welsh plains for clothing their negroes, and resorted to home manufactures only when rice was exceptionally low. The production of silk was increasing and Charleston had a sugar refinery. Georgia, like the Carolinas, manufactured naval stores, and exported timber and boards in considerable quantities. Its report barely mentioned homespun industries. Western Florida made tar and brick and had one sawmill.

The tenor of all these reports was to depreciate colonial manufactures and to assure the British Government that such industries could never seriously compete with those of the mother country. Several manufactures entirely escaped attention, and no statement was made of comparative conditions in 1733 and 1767—the most illuminating single fact that could have been established. Some governors alluded to the way home manufactures were magnified by the colonists at the time of the Stamp Act.

Governor Wentworth, who was himself a colonial and a Harvard graduate, though a loyalist, asserted that colonial attempts of this kind would "ruin the fortunes and bring the designs of those who undertake manufactures, not only in this province but in New England, into contempt, if they are neglected and unnoticed." Governor Bernard asserted that "for New England to threaten the mother country with manufactures is the idlest bully that ever was attempted to be imposed upon sensible people." Governor Moore, who was born in Jamaica and had resided in the colonies most of his life, and was not unsympathetic with colonial conditions, wrote:

> "Last year, when the riots and disorders here were at their height on the occasion of the stamp act, these manufactures were greatly boasted of, and the quantity then made greatly magnified by those who were desirous of distinguishing themselves as American patriots, and would wear nothing else. They were sometimes sold for three times their value; but the manufacturers themselves showed that they had more good sense than the persons who employed them; for they never clothed themselves with the work of their own hands, but readily brought it to market, and selling it at an extravagant price there bought English cloths for themselves and their families."

Cadwallader Colden, who had resided in Pennsylvania and New York fifty-seven years, whose son was later a leading citizen of New York State, and who was himself at this time lieutenant-governor, stated in an account of the province written in 1765,[48] "What has been published of the manufactures lately set up are absolute falsehoods, and yet they are not ashamed to publish them when they are known to be such." He explained the decrease of importations from Great

[48] *Cf.* also Governor Moore to Earl of Hillsborough, May 7, 1768, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VIII, 66.

Britain as partly due to the conclusion of peace with France,[49] which occasioned "the recalling or disbanding the greatest part of the army, but chiefly the entire stop to the trade with the French colonies, who were supplied from the British colonies while their commerce with France was shut up."

In 1768 Benjamin Franklin wrote from London, where he was representing colonial interests, to his son, who was then governor of New Jersey, encouraging him to reassure Parliament as to the small headway made by domestic manufactures in that colony. After stating that the reports already received from other governors "are all much of the same strain, that there are no manufactures of any consequence," he added:

> "These accounts are very satisfactory here, and induce the Parliament to despise and take no notice of the Boston resolutions. I wish you would send your account before the meeting of next Parliament. You have only to report a glass-house for coarse window glass and bottles and some domestic manufactures of linen and woolen for family use, that do not half clothe the inhabitants, all the finer goods coming from England and the like. I believe you will be puzzled to find any other, though I see great puffs in the papers."[50]

In a letter the following year he informed another correspondent that the people of England believed attempts to manufacture in the colonies would not permanently affect importation, because "tho' the men may be contented with homespun stuffs, the women will never get the better of their vanity and fondness for English modes and gewgaws."[51]

However, previous to this Franklin had testified before Parliament: "I do not know of a single article imported into the northern colonies, but what they can either do without or make themselves." During the same hearings, Mr. Balfour, a London merchant, stated that in Virginia, where he had resided twenty-five years, "there are already manufactures which I have seen and worn and are to be seen in every house there." Elsewhere he explained that there was "no grand manufactory, but all the people do manufacture. I believe the people can live with the greatest ease without British manufactures." Other witnesses confirmed this as generally true of the colonies. The large number of sheep met with in America was emphasized. Franklin thought that within three years the colonists could produce enough wool for their own consumption.[52]

Parliament had called for information regarding American manu-

[49] See Colden's letters to Lords of Trade and statement, Mar. 9, 1764, and Dec. 6, 1765, respectively, in O'Callaghan, *Documents Relative to the Colonial History of New York*, VII, 612, 799.

[50] Benjamin Franklin to William Franklin, March 13, 1768, in *Works*, V, 116–117. Governor Franklin was suspected of having a financial interest in an illegal slitting mill in New Jersey; New Jersey Historical Society, *Proceedings*, Ser. II, vol. VI, 165.

[51] Benjamin Franklin to Samuel Cooper, Apr. 27, 1769, in *Works*, V, 203, 204; *cf. id.*, VIII, 610.

[52] "Benjamin Franklin's Testimony," in British Museum, *Additional Manuscripts*, 33030, in *British Transcripts*, Library of Congress, 17.

factures in view of a political crisis, and the evidence it obtained was unavoidably colored by the circumstances of that crisis. Every royal officer wished to convince the home authorities that he had been watchful to prevent the rise of industries hurtful to British interests. For a governor who had occupied office for any length of time to admit the existence of flourishing manufactures within his jurisdiction would have been to convict himself of negligence in enforcing a policy which Englishmen believed vital to their political as well as their economic interests in America. Earlier officials, writing when colonial manufactures hardly could have been so well developed as in 1766, had given more alarming accounts of their possibilities. Sixty years before this Lord Cornbury informed his government that the colonists could not be expected to remain loyal to British interests—

"If they are suffered to go on in the notions they have, that as they are Englishmen so they may set up the same manufactures here as people may do in England; for the consequence will be that if once they see they can clothe themselves not only comfortably, but handsomely too, without the help of England, they, who are not over fond of submitting to our government, would soon be putting into execution designs they have long harbored in their breasts."[53]

In 1748 the traveler Kalm noted that the restrictions on local manufactures imposed by the British Government "occasioned the inhabitants of the English colonies to grow less tender of their mother country."[54] The opinion was common in England that all manufacturing and traffic in local manufactures in the colonies was illegal. A writer of the time, less hampered by politic considerations than the governors who had just reported upon this subject, felt constrained to inform his countrymen as follows:

[The people of North America] "do make many things and export several manufactures to the exclusion of English manufactures of the same kind, and the New England people import from foreign and British islands very large quantities of cotton which they spin and work up into stuff like that made in Manchester, wherewith they clothe themselves and their neighbors. Hats are manufactured in Carolina and Pennsylvania and other colonies. Soap and candles and all kinds of wood work are made in the northern colonies and exported to the southern. Coaches, chariots, chaises and chairs are also made in the northern colonies and sent down to the southern. Coach harness and many other kinds of leather manufactures are likewise made in the northern colonies and sent down to the southern; and large quantities of shoes have lately been exported from thence to the West India Islands. Linens are made to a great amount in Pennsylvania and cordage and hemp manufactures are carried on in many places with great success. Foundry ware, axes and other iron tools and utensils are also become articles of commerce with which the Southern colonies are supplied from the northern."[55]

[53] Lord Cornbury to Secretary Hedges, July 15, 1705, in O'Callaghan, *Documents Relative to the Colonial History of New York*, IV, 1151.

[54] Kalm, *Travels into North America*, I, 206.

[55] *Interest of the Merchants and Manufacturers of Great Britain in the Present Contest with the Colonies*, 25.

A truer impression of colonial manufactures than is afforded by the official reports may be gathered from a letter of Comptroller Weare to the president of the Board of Trade, which, though written a few years earlier, is equally applicable to conditions up to the Revolution:

"Upon actual knowledge therefore of these northern colonies, one is surprised to find that, notwithstanding the indifference of their wool and the extravagant price of labor, the planters throughout all New England, New York, the Jersies, Pennsylvania, Maryland (for south of that province no knowledge is here pretended) almost entirely clothe themselves in their own woolens, and that generally the people are sliding into manufactures proper to the mother country, and this not through any spirit of industry or economy, but plainly for want of some returns to make to the shops. * * * But the public are assured that no manufactures are carried on in our colonies; that such as were attempted have, through the local price of labor and insurmountable difficulty of collecting the whole necessary apparatus, been laid aside, and that as the people will always confine themselves to agriculture. * * * It would be ridiculous to imagine that people bred in all the improvements of Europe should, by crossing the Atlantic, so unaccountably lose all remembrance of former skill and knowledge, as to betake themselves entirely to agriculture, and not once dream of improving those advantages, or applying those materials with which the country abounds, to the common use of human life; neither can it be supposed that because there may as yet be no such manufactory as those at Abbeville or Sheffield, that every planter in America raises flocks of sheep only for the table, and flax only to supply Ireland with seed; nor because hats, bottles, paper, braizery, etc. appear in the list of British exports, that hatters, glass houses, paper mills, founders, etc. etc. were not to be found in several of the colonies. Their industry, however, in these respects, is not mentioned to their discredit, only as a matter of fact and truth."[55]

Ample grounds existed for correcting the high-flown accounts of home manufactures which the political policy and patriotic enthusiasm of Americans had used to influence public opinion in England against legislation hostile to their welfare. Yet the event of the Revolution showed that Franklin was right in advising Parliament that the colonists could supply themselves with essential manufactures without recourse to Great Britain. Apparent discrepancies between this statement and the disparaging—sometimes satirical—allusions to colonial industries that occur elsewhere in his writings are caused by different points of view. In asserting the industrial self-sufficiency of the colonies Franklin was not considering a normal, unforced condition of trade and manufactures, but something resembling a state of siege. If some natural calamity had isolated permanently the colonies from Europe in 1765, civilization would have survived and few industrial arts would have been entirely lost. This was in essence the claim made at the time by the political propagandists of manufactures in America, and a fact that it was not so easy for the people of Great Britain to realize or accept. The governors upon whom the English

[55] *Letter of Comptroller Weare*, Massachusetts Historical Society, *Collections*, Ser. 1, 74, 79.

public depended for information were influenced in their judgment of American manufactures not only by desire to propitiate the home authorities with reassuring reports, but also by the class bias of men whose associations were mostly with the wealthier colonists, among whom importing merchants formed an important element. Some merchants were patriots, but those closest socially to royal officials were Englishmen or loyalists, inclined to look down upon Americans and to undervalue their achievements and abilities. The correspondence of the time reveals many commercial and political Braddocks, willfully blind to the conditions surrounding them. They discredited, upon *a priori* ground of prejudice, any account of colonial enterprise that ran counter to accepted hypotheses of the inevitable industrial dependence of the colonies upon the mother country. Somewhere between this official, loyalist, and biased-commercial skepticism regarding colonial manufactures and the buoyant optimism of the partisan supporters of home industry, lies a true opinion of these conditions at the outbreak of the Revolution.

CHAPTER X

THE POLITICAL PROPAGANDA OF HOME INDUSTRY AND MANUFACTURES DURING THE REVOLUTION

Period of non-importation, 215. Manufactures of the Revolution, 219. Manufactures of the Confederation, 227.

PERIOD OF NON-IMPORTATION

The revolt against parliamentary taxation, that began with the passage of the revenue laws of 1764 and 1765, added a political motive to earlier influences promoting colonial manufactures. Though this incentive was not economic, it had economic consequences. Among measures taken to resist parliamentary control was an organized boycott against British goods. Associations of merchants entered into non-importation agreements, and patriotic societies of consumers not only ceased to use British wares, but, following the traditions of the earlier spinning societies, actively promoted home industries. The movement first became general in 1765, with the passage of the Stamp Act, when the merchants of New York, followed by those of Massachusetts, Rhode Island, and Pennsylvania, agreed not to import from Great Britain or to sell British goods sent them on commission. Trade temporarily revived upon the repeal of the act, the next year, but in 1769, with renewed agitation against parliamentary taxes, the people of nine of the colonies entered into a new non-importation agreement, which was so effective as to cause a decline of nearly two-thirds in the sales of Great Britain to the northern colonies.[1] The direct purchases of the plantation provinces from England decreased, while their actual consumption of British goods fell off still more, as it was partly represented by the northern importations that came to them through the coasting trade. In 1771 another period of active commerce with England ensued, which terminated with two resolutions of Congress, in 1774 and 1775. The first of these called upon all the colonies to cease importing British manufactures either directly from that country or from other places, and the second forbade the exportation of American produce, except tobacco and rice, to Great Britain or her possessions.[1]

The non-importation policy promoted domestic industry, not only by decreasing the supply of competing manufactures, but also by creating a preference for homemade goods. Previous market con-

[1] Bishop, *History of American Manufactures*, I, 374; 379.

ditions were reversed, and for a time American manufactures commanded a premium. What part of the total consumption was thereby supplied is difficult to estimate. Between 1765 and 1775 the volume of foreign trade varied greatly; for excessive importations followed each period of curtailed purchases. Assuming prices to have remained constant, the average amount of merchandise annually brought into the colonies exceeded that of the previous decade, but it was doubtless less than it would have been under normal conditions.[2] Had American manufactures been organized on a factory basis, employing large capital and an operative population, these violent market changes would have been ruinous, even though the relative consumption of domestic goods was increasing. But homespun and workshop industries expanded and contracted with a minimum displacement of labor and capital. They silently adjusted themselves to changing conditions and at the outbreak of the Revolution were more adequate than they otherwise would have been to supply the immediate needs of the colonists.

The same characteristics make it difficult to picture in detail the progress of these industries. Too much importance should not be ascribed to those periods of enthusiasm when wealthy merchants and college graduating classes appeared in clothing of American manufacture. Doubtless such incidents helped to set a fashion for home-made goods, but the event proved that their influence was not permanent. More important for the textile industries was the systematic extension of sheep-raising and the practical abolition of mutton from patriotic tables. Advertisements of American manufactures became common, and indicated varied and not unimportant industrial activities.[3] In Boston the town gave assistance to the textile enterprises at the Manufactory House, which have already been described. Some attempt was made to manufacture broadcloth at Hempstead on Long Island, and at Philadelphia;[4] East Hartford annually wove 17,000 yards of woolen cloth, and Scituate submitted 15 samples of different woolen fabrics made in the vicinity, including broadcloths and serges.[5] At Brookfield a private undertaker erected a two-story building 50 feet long for manufacturing woolens.[6] In 1768 many hundred yards of domestic broadcloth were reported to have been sold at auction in New Jersey for $2.67 a yard.[7] During that year three

[2] Computed from tables in *Cyclopedia of Commerce*, I, 875; *cf.* Whitworth, *State of the Trade of Great Britain*.

[3] *E.g.*, advertisements, Lynn shoes, *Boston Gazette*, Mar. 7, June 6, 1765; worsted hose, gloves, caps, breeches patterns, *id.*, Jan. 14, 1768; homespuns, *id.*, Apr. 21, Sept. 1, 1768; New England manufactured clothes for winter wear, etc., *id.*, Nov. 23, 1769; *Boston Newsletter*, June 1, 8, Sept. 21, 1769; tobacco, snuff, pipes, sheathing paper, *Boston Gazette*, Dec. 15, 1768; Apr. 7, 1769; Mar. 14, 1771; hose, *Pennsylvania Gazette*, May 1, 1766.

[4] *London Chronicle*, 1764, 413, 518, quoted in Bishop, *History of American Manufactures*, I, 366; advertisement, *Pennsylvania Gazette*, July 27, 1769.

[5] *Massachusetts Gazette*, Jan. 14, 1768; Bagnall, *Textile Industries*, 56.

[6] *Boston Newsletter*, Oct. 6, 1768, quoted in Bagnall, *Textile Industries*, 57.

[7] *New York Gazette and Weekly Mercury*, May 9, 1768, in New Jersey, *Archives*, XXVI, 157.

families at Woodbridge manufactued 1,580 yards of linens and woolens.[8] The following year a gentleman returning from a trip through New Jersey, Pennsylvania, and Maryland reported such activity everywhere in household manufactures that a good deal of cloth was preparing for market.[9] In 1774 announcements of small "factories" for weaving and fulling cloth began to appear in the Virginia papers.[10] At this time some domestic manufactures appear to have been hampered by lack of a cash market for their products. The *Pennsylvania Gazette*, in 1776, complained that "many poor people (old and young) would spin a little if they knew where to turn it into ready money at the end of the week or month."[11] Linen manufactures were encouraged by the private societies already mentioned at New York and Philadelphia. The policy of granting premiums was popular,[12] and in the latter city annual exhibits were held at which prizes were given for the most excellent products of home industry. Woolen and cotton cloth, stockings, leather, shoes, whisky, ironware, and paper hangings were among the articles receiving this distinction. It was claimed early in 1765 that fourteen new branches of manufacture had been recently established in America.[13] All the colonies shared in this movement, Virginia and the Carolinas no less than New England and Pennsylvania, and acquired thereby added consciousness of their own resources.

It is important, however, to distinguish between household and village crafts, diffused throughout the whole community and becoming fairly adequate to supply all urgent necessities, and those integrated industries that, though less essential, were more in public view. Attenton to the latter was in a sense forced, and there was a significant skepticism, not only among British observers resident in the colonies but also among intelligent Americans, as to the real stability and sufficiency of such enterprises. Peter Hasenclever, an experienced textile manufacturer as well as ironmaker, wrote:

"The great rodomontades which the Boston people have made have animated some of our citizens to become economists and manufacturers in theory, but little in practice. * * * It is laudable that every father of a family promotes his interest, and every patriot contributes to the public welfare; but this country is not yet ripe for manufactures. Labor is too high—too much land to be settled. To erect fabrics [factories] is to ruin the landed interest. The country people must resort to towns and the land will lie waste and incult. Fabrics should not be established, then, in countries where there are [not?] more people than what can be employed in agriculture, and therefore I think the present zeal to establish manufactures is premature."[14]

[8] *New York Journal and General Advertiser*, Jan. 21, 1768, in New Jersey, *Archives*, XXVI, 16.
[9] *Pennsylvania Journal*, Apr. 20, 1769, in New Jersey, *Archives*, XXVI, 419–420.
[10] *Documentary History of American Industrial Society*, II, 326, 327; *cf.* Appendix VII.
[11] *Pennsylvania Gazette*, Feb. 21, 1776, in New Jersey, *Archives*, Ser. II, vol. I, 46.
[12] Advertisement, *Boston Newsletter*, Sept. 21, 1769; *Pennsylvania Gazette*, May 30, 1771; Bagnall, *Textile Industries*, 52; Bishop, *History of American Manufactures*, I, 368, 369.
[13] Bishop, *History of American Manufactures*, I, 369.
[14] Peter Hasenclever to Sir William Johnson, New York, Jan. 6, 1768, in *Johnson Papers*, X, 69.

However, the same observer thought that manufactures of linen might get a foothold in New York during the political disturbances and that scarcity of money might lower wages so that it would be possible to make other things.[15] The New York Society for Promoting Arts and Agriculture, at the time of the non-importation agreement of 1768, evidently considered that colony able to provide at once its own iron castings, gross hardware, stockings, and possibly its linen. Apparently it was not the purpose to pay materially higher prices for domestic than imported commodities; for sugar refiners were informed that refined and loaf sugar would be admitted from abroad unless they obligated themselves to give sugar as cheap as the English.[16] Though New England afforded a better field for specialized manufactures than New York, John Adams wrote twelve years later: "America will not make manufactures enough for her own consumption these thousand years."[17] Franklin had asserted previously that during the several centuries that would be required to populate the country as far west as the Mississippi the colonists would not "find themselves in a condition to manufacture, even for their own inhabitants, to any considerable degree."[18] The inconsistency of this statement with his claim before Parliament, that the colonies might at once become industrially self-supporting, was not due entirely to an accommodation of testimony to political exigencies, but rather to the unexpressed distinction earlier noted between household and capitalized industry.

The non-importation agreements, therefore, somewhat broke the shock of the interruption of commerce that followed the outbreak of hostilities with the mother country, without materially changing the status of organized manufactures. This was partly because the agreements were temporary and did not look to the permanent economic autonomy of the colonies; therefore they gave little encouragement to enterprises that required the investment of large capital and the assembling and training of a special class of labor. Indeed, the disturbance of commerce, the unsettled financial conditions, and the general precariousness of business, consequent upon a political movement expressed directly in the trading policy of the nation, must have tended to arrest rather than promote industrial enterprises. These influences were probably not more than counteracted by the efforts of certain societies, such as those already described in connection with the factory system, to foster such undertakings. Refusals to buy British goods, therefore, were a symptom rather than a cause of the ability of the colonists to do without them; and they did not influence greatly

[15] *Johnson Papers*, XII, 213; *cf.*, however, Alexander Mackraby to Sir Philip Francis, Philadelphia, May 4, 1770, in *Pennsylvania Magazine of History*, XI, 493.

[16] Peter Hasenclever to Sir William Johnson, Jan. 6, 1768, in *Johnson Papers*, X, 69.

[17] John Adams to Benjamin Franklin, Aug. 17, 1780, in Adams, *Works*, VII, 247.

[18] "The Interest of Great Britain Considered with Regard to her Colonies," 26, in Franklin, *Works*, IV, 55.

the gradual progress of commercial manufactures outside the sphere of household industry. Homespun fabrics, however, entered more generally into exchange than previously, and this may have favored the transition from household to specialized textile industries.

MANUFACTURES OF THE REVOLUTION

The effect of the Revolution upon domestic manufactures was more positive and permanent than that of the non-importation agreements. Foreign supplies were likely to be cut off or curtailed for an indefinite period. The resumption of trade, it was hoped and anticipated, would be on a different basis than formerly. British restrictions on colonial manufacturing were believed to be a thing of the past. Moreover, an immediate and urgent demand was created for war supplies.

At the outbreak of hostilities the colonies already produced enough iron for civil and military requirements. A line of furnaces and forges extended from New Hampshire to South Carolina. During the colonial wars cannon had been cast at several places. Nevertheless, the conflict with the mother country brought a sudden change to colonial ironmakers and for a time curtailed production. British markets, which had taken a large part of the pigs and bars made in America, and whose demands had called into being a good proportion of the colonial furnaces and forges, were abruptly closed. Several ironmasters, who adhered to the English cause, were forced to leave the country and had their property confiscated. Consequently, some furnaces were shut down for want of a manager, others for want of their usual market; and an even greater number were partly or wholly idle for lack of workmen, who were drawn off to the army. On the other hand, the interruption of commerce and the need of the colonial armies for cannon, shot, shell, and other war materials created an insistent demand for iron in those forms; while the never-ceasing growth of population and extension of settlement inland maintained an expanding market for tools and implements, which to a greater extent than before were supplied from domestic sources. Therefore, such furnaces and forges as could get labor and were not subject to the harrying of the contending armies had more work than they could do.

Congress and the individual States gave evidence of the concern felt for adequate iron supplies by laws exempting workmen employed at furnaces and forges from enlistment, and by various encouragements given for the establishment of new works or the operation of those already in existence. Virginia subsidized such undertakings,[19] and North Carolina appropriated £5,000 to lease or purchase existing works in Guilford County.[20] South Carolina, whose only furnace was de-

[19] Virginia, *Statutes at Large*, IX, 303; *cf.* Virginia, *State Papers*, I, 366, 372, 453, 454, 531; Swank, *Iron in All Ages*, 266, 269; Bruce, *The Iron Industry in Virginia*, Chap. I.

[20] Swank, *Iron in All Ages*, 272.

stroyed by the Tories early in the war, made an unsuccessful effort to reëstablish this industry within her borders.[21] The Connecticut Council of Safety, at the outbreak of hostilities, took possession of the Lakeville furnace, owned by a royalist who had fled to England, and spent £1,450 preparing it to cast cannon and ammunition. This furnace supplied guns for the New York forts and for the batteries of the *Constitution* and *Constellation*.[22] The New York works furnished anchors for our first ships of war; and those at Sterling, about 25 miles back of West Point, forged, in six weeks, the 180-ton chain that was stretched across the Hudson to prevent British cruisers from ascending the river.[23] Meanwhile the hollow ware furnaces of eastern New England were busy casting shot and shell for the army. On account of their proximity to Philadelphia and to the main field of military operations, the Pennsylvania and New Jersey furnaces received large contracts for war supplies, though plants in the latter State suffered from the ravages of the enemy.[24] Therefore, after a temporary depression following the outbreak of hostilities, such American iron works as continued operation were abundantly occupied.

However, furnace activity was curtailed repeatedly by lack of labor, and the profits of government contracts were sometimes illusory. Necessity knew no law in the emergency of a campaign. The works of Tories were seized without compunction, and even patriot ironmasters were subject to requisitions paid for in depreciated paper. Not only enlistments, but the interruption of commerce, which made it impossible to renew the supply of slaves and indentured servants who previously had been a main reliance for labor in this industry, rendered it difficult for furnace-owners to obtain workmen. Some plants in Pennsylvania were operated with Hessian prisoners leased from the Continental Congress.[25]

Consequently, outside of operations for the government, the commercial manufacture of iron declined. Many bloomeries—some 18 or 20 in Maryland alone—were kept busy supplying the demands of neighboring farmers. European iron found its way through the British blockade to colonial merchants. Such scanty evidence as we have indicates that prices, after allowing for the depreciation of the currency, did not rise higher than they had been in several instances before the Revolution. But the iron trade, which during the preceding half century had established an exporting furnace and forge industry in America, was entirely lost—not to be recovered in any degree until one hundred years later. Moreover, the withdrawal of British capi-

[21] Pearse, *History of Iron Manufacture in America*, 94; Swank, *Iron in All Ages*, 276.
[22] Pearse, *History of Iron Manufacture in America*, 40.
[23] Swank, *Iron in All Ages*, 139, 140; Lossing, *Field Book of the Revolution*, I, 705.
[24] *E.g.*, Pennsylvania, *Archives*, Ser. I, vol. VIII, 453, 456; *Pennsylvania Magazine of History*, V, 80; New Jersey Historical Society, *Proceedings*, Ser. II, vol. VI, 165–172.
[25] Swank, *Iron in All Ages*, 176, 180; *cf.* New Jersey Historical Society, *Proceedings*, Ser. II, vol. VI, 170–172.

tal and the impoverishment of many colonial ironmasters during the war lessened the resources available for maintaining old plants and erecting new ones. A temporary retrogression of the whole industry resulted, causing it to revert from an export-commercial to a neighborhood or almost homespun stage, in which numerous small forges and bloomeries supplying local demands occupied a relatively more important position than formerly.

On the other hand, the manufacture of steel, which had little ground to lose from its rudimentary development in colonial times, made definite progress during the Revolution. In 1750 five plants were reported in the colonies, one each in Massachusetts, Connecticut, and New Jersey, and two in Philadelphia. As the British act of 1750 prohibited the erection of new works in America, these were presumably the only ones in operation at the outbreak of the Revolution. However, Peter Hasenclever made steel by a process that dispensed with the illegal furnaces.[26] In 1776 William Hawxhurst had six forges for this purpose nearing completion at Sterling, and two which were in operation, and he advertised for men "to make pig metal into steel in the German way."[27] During the Revolution the same process was employed in Rhode Island, and possibly elsewhere in New York and New Jersey. New blister-steel furnaces were erected in Massachusetts and New York.[28] In 1778 Congress directed that steel be manufactured in New Jersey, at the Andover works, which had been owned by loyalists.[29] In 1776 a new steel plant was erected at Trenton or the old one was reconstructed on a larger scale than formerly.[30]

Firearms had been manufactured in the colonies from an early date, and before the middle of the eighteenth century a single Massachusetts maker had filled an order of the provincial government for 500 muskets.[31] In 1775 it was optimistically reported that the gunsmiths of the Quaker colony could furnish annually 100,000 stand of arms.[32] The rifle, probably introduced from Germany by the early Holland or German settlers, was the favorite firearm of the frontier and became the distinctive weapon of American recruits from west of the Hudson. At the beginning of the Revolution their manufacture was established from New York to North Carolina. About 1750 Kalm noted the riflemakers of Albany, and for many years Lancaster rifles had enjoyed a wide reputation throughout the back settlements.[33] Military needs

[26] *Report to Governor Franklin on the Hasenclever Enterprises*, Appendix; New Jersey, *Archives*, Ser. II, vol. I, 238 (note).

[27] *New York Gazette and Weekly Mercury*, Apr. 8, 1776, in New Jersey, *Archives*, Ser. II, vol. I, 77–78.

[28] *American Manufacturer*, May 28, 1829; Swank, *Iron in All Ages*, 381; Newton, *Early History of Amenia*, 127.

[29] *Pennsylvania Gazette*, June, 4, 1777, in New Jersey, *Archives*, Ser. II, vol. I, 388 (note)

[30] New Jersey, *Archives*, Ser. II, vol. I, 238 and note.

[31] Massachusetts Historical Society, *Collections*, Ser. I, vol. IX, 265; Bishop, *History of American Manufactures*, I, 486, 487.

[32] Bishop, *History of American Manufactures*, I, 572.

[33] Bittenger, *Germans in Colonial Times*, 289; Chastellux, *Travels in North America*, I, 406; II, 312; Weld, *Travels*, 94, 95; Kalm, *Travels into North America*, II, 95; Tompkins, *History of Mecklenburg County*, I 43.

created a market for this industry that favored its organization on a factory basis. This influenced subsequent metal manufactures, because after the war private armories employed their plants for making tools and hardware. Instead of being located at seaports, these establishments were usually placed for protection at interior points, where in some instances they became pioneers of future industrial centers. In New England, Springfield and Waterbury date their metal manufactures from this beginning.[34]

Even during the war local makers began to supply, to a greater extent than previously, many minor articles of iron and steel hitherto imported. Slitting mills and forges could now be erected freely, and nail-rods came from domestic sources. Nail-making had occupied many winter hours by the fireside of the colonial farmers, but small nails and tacks were genrally made in England, where labor was cheaper. Shortage of the latter during the Revolution suggested to a Rhode Island mechanic the expedient of cutting them from plates with heavy shears, from which developed the cut-nail industry, soon to become one of the most important as well as the most characteristic branches of metal manufacture in America. About this time automatic machinery was applied also to replace hand labor in cutting and bending card-teeth. This so cheapened the manufacture of cards that after the war America supplied not only the domestic market but also in part the market of Great Britain.[35]

As soon as hostilities with the mother country were seen to be inevitable, powder-mills were established at Andover, Stoughton, Bradford, Morristown and other points. Five years after the surrender of Cornwallis, Pennsylvania had 21 such mills, with a reported annual capacity of 625 tons.[36] This industry continued to flourish in America, not only on account of the demands of the frontier, but because of the rapid extension of mining, canal-building, and other development work, where the use of explosives, like that of machinery, was stimulated by the high price of labor.

Salt was very important in the domestic economy of the colonists, who, having little knowledge of refrigerating and canning, employed it not only to preserve fish and meat for home use, but for the commercial manufacture of provisions. It was easily imported, coming back from the West Indies and southern Europe in the natural round of colonial trade; but its manufacture was one of the earliest industries attempted in Virginia, New York, and New England, and was carried on with varying vigor and success throughout the colonial period. However, at the beginning of the Revolution the production was not

[34] Bishop, *History of American Manufactures*, I, 494, 516; Weeden, *Economic and Social History of New England*, II, 793.

[35] See 418.

[36] Van Gelder and Schlatter, *History of the Explosives Industry in America*, 33–70; Stephenson, "The Supply of Gunpowder in 1776," in *American Historical Review*, XXX, 274–276, Jan. 1925; Coxe, *Observations on the United States*, 28–29; Brissot, *Voyage*, II, 390.

equal to the demand, and while importations continued during the war, both public and private enterprise were enlisted to increase its domestic manufacture. These undertakings, while fairly fulfilling their purpose at the time, did not develop into important permanent industries. They depended on sea-water, while the larger salt manufactures of the Republic finally arose in the vicinity of inland salt-wells.

The manufacture of paper, glass, and pottery were at the opening of the Revolution no longer pioneer industries, but they appear to have been perfected and extended during the period of hostilities. Domestic manufactures of leather and leather goods, and of furs and hats, nearly supplied the ordinary demands of the colonists before the cessation of intercourse with the mother country. Their growth during the war, if any, was limited to meeting the increased demands of a multiplying population.[37]

American consumers felt the cessation of supplies from the mother country principally in the case of woolen cloth; yet it would be easy to overestimate the hardship thus occasioned. Our information regarding the scarcity of textiles at this time relates principally to deficient clothing for the army. But this, like many other troubles of the Continental Government, was due more to faults of revenue and currency than to a general lack of supplies. Household looms not only clothed the families of their owners, but provided a surplus for sale. As early as 1775 domestic linens were shipped by the wagon-load from the back counties of the South to clothe the slaves of the lowland plantations. It was estimated that Augusta County, Virginia, produced enough osnaburgs to supply the entire population of the State.[38] By 1779 a British officer under detention near Charlottesville reported that the people wore exclusively their own manufactures, intimating that this was less from necessity than in order to encourage frugality and industry.[39] While New England required heavier clothing than the South, and may have been obliged to substitute flax and cotton for wool in cases where the latter would have been preferred, we have no specific evidence of suffering or even of inconvenience on account of lack of this commodity.

The political revolution in America was contemporaneous with the early stages of the industrial revolution that started in England with the successful application of automatic machinery to spinning and with the invention of the steam-engine; but during the war Americans derived no benefit from these improvements. As early as 1775 a spinning-jenny had been brought to Philadelphia,[40] and some years previous to this steam-engines of a primitive type had been used

[37] McLane, *Report on Manufactures*, II, 841.

[38] Letter of Matthew Pope, of Yorktown, to John Jacob, of London, Aug. 25, 1775, in British Museum, *Additional Manuscripts*, 34813, f. 88.

[39] Anburey, *Travels through the Interior Parts of America*, II, 426, 427; *cf.* also *Niles' Register*, XLIII, 3, Sept. 1, 1832.

[40] *Pennsylvania Magazine*, I, 158, with illustration of jenny.

to pump water from a New Jersey and a Rhode Island mine.[41] To establish such inventions in a new country, however, required longer time and more settled conditions than then prevailed, irrespective of the jealous prohibition that already stood in the way of their introduction from England. They affected in no way the incipient manufactories that, independently of mechanical improvements and political agitation, were beginning to make headway before the war in New England, New York, and Pennsylvania. Neither did the war itself have any appreciable influence upon organized textile manufactures, except by bringing independence, which was favorable to their prosecution after peace was declared. The direct effect of the Revolution upon this branch of industry was mainly to increase the production of wool and cotton, to popularize the use of domestic fabrics, especially in the South, and to hasten the transition of homespun manufactures into household industries, organized by merchant employers and small manufacturers who supplied a commercial market. All of these conditions favored the adoption of power textile machinery in America as soon as an opportunity was afforded to obtain it.

Uncertainties of commerce, the harrying of the seacoast by a hostile fleet, and the occupation of important towns by the British army, diverted to the development of internal resources part of the capital and of the skilled administrative ability of the colonists, that otherwise would have been given to trading. This change foreshadowed the greater revolution in investment that occurred at the time of the Embargo and Non-intercourse laws and the War of 1812. Interior communication was improved; mill-sites were occupied farther from the coast-line; settlements were pushed westward. Ground was prepared for the inland manufacturing communities that started about the time of the cession of Canada, in 1763, survived the war with England, and multiplied in number and importance after the adoption of the Constitution. This westward movement increased the relative demand for manufactures used on the frontier, which were of the coarse and more substantial sort that home industry and local craftsmen could best supply. The self-sufficiency of these remoter settlements was remarkable. During the war the colonel of a Georgia regiment was able to write: "I have made all my own accoutrements, even to the swords for my dragoons, caps, leather jackets, boots, and spurs—in short, every article."[42]

Yet while the country was growing in strength and resources as a whole, and extending its western boundaries of settlement, it was losing in the loyalist emigration not only people, but capital and in-

[41] Hornblower, *First Steam Engine in America*, 14, *et. seq.; New York Mercury*, Mar. 22, 1762, in New Jersey, *Archives*, XXIV, 19; McLane, *Report on Manufactures*, I, 927; Crévecœur, *Lettres d'un Cultivateur Américain*, III, 509, 510; *cf.*, however, Foster, *Stephen Hopkins*, 109–110 and Weeden, *Early Rhode Island*, 330–331.

[42] Jones, *History of Georgia*, II, 498.

dustrial experience. Generally, however, the class of small artisans from which manufacturers were recruited sided with the colonies. Loyalists were especially numerous among the wealthier importing merchants, whose interests were involved in the promotion of British trade, and whose social and business relations with the mother country naturally were more continuous and intimate than those of other Americans. The iron-masters, already mentioned, were the only industrialists among whom British sympathizers proved to be numerous, and this resulted in part from the fact that continued access to British markets conditioned the prosperity of their undertakings. Among commercial men, on the other hand, was a Scotch and Scotch-Irish element—the latter strongly intrenched in colonial trade—which was strongly patriotic; indeed during the actual progress of hostilities assistance for the colonists was solicited covertly in Ireland through these sources.

As soon as the first adjustment to war conditions was over, many of the colonies continued their internal development without much regard to military operations. After Boston was evacuated, in 1777, New England—outside of a small section around Newport—had little direct experience with war. That year a Boston merchant wrote:

"Though our money has depreciated, the internal strength of the Country is greater than when the war began; and there is hardly a town that has not more ratable polls than at that time. And though many individuals suffer, yet the farmer and bulk of the people gain by the war."[43]

A French officer, who traveled through New England in the closing years of the Revolution, noted of West Hartford:

"Their inhabitants add some industry likewise to their rich culture, some common cloths and other woolen stuffs are fabricated here, and sufficient to clothe the people who live in the country, or in any other town than Boston, New York and Philadelphia."

He visited a small manufactory where cloth, brought in from the country, was dressed, dyed, and pressed for some 33 cents a yard. At Farmington, again, he entered a house where he saw men working at a trade, whose labors he thus describes:

[I] "found them making a sort of camblet, as well as another woolen stuff with blue and white stripes for women's dress; these stuffs are sold at *3 s.* 6 *d.* the yard lawful money, or about 22 *d.* English. The sons and grandsons of the family were at work: one workman can easily make five yards a day."[44]

The prime cost of the materials in these fabrics was about 17 cents a yard, and the profits of each worker's labor amounted to between $1 and $2 a day. In 1782 Samuel Wetherill advertised jeans, fustians,

[43] J. and J. Amory, *Manuscript Letters*, quoted in Weeden, *Economic and Social History of New England*, II, 779–780.

[44] Chastellux, *Travels in North America*, I, 37, 38, 39.

everlastings, and coatings, to be sold at his "manufactory" in Philadelphia.[45] A New Jersey account-book of this period records the transactions of a sheep-owner who leased his sheep to farmers for wool rent, and had wool spun and woven in his family for customers.[46] However, the waste of war was felt seriously for a time in this colony, as it was later by Georgia, the Carolinas, and lower Virginia. In South Carolina the Tory raiders burned the loom houses of the settlers and bayoneted or shot their sheep, even when these could not be used for food.[47] But the great hardship of the planting provinces was in being cut off from an export market for their rice and tobacco. Therefore, while the comparative tranquillity of many sections of the North allowed manufactures customary before the war to continue and increase, in the South the unorganized and delocalized conflict of local factions so disturbed economic conditions as to leave the people no recourse but to supply their wants by such homespun industries as they could prosecute in the midst of interrupted trade and general insecurity.

Although those primary manufactures and forms of agriculture that depended on a foreign outlet for their products were checked by commercial risks and by the chaotic condition of the currency, no unemployment resulted general enough to encourage by the mere presence of idle hands the extension of manufactures for local demand. Indeed, inland settlement, military service, and privateering absorbed surplus labor to such an extent that the making of iron and salt was hampered by lack of workmen, and even farm help was not abundant. Not only Hessians, but Highlanders captured during the war, and probably many Irish and some English prisoners and deserters, found ready employment, and many of them settled permanently in America.[48]

Fifty years after the conclusion of peace an able and experienced observer, old enough to remember the Revolution and practically familiar with the subsequent industrial development of the country, wrote that at the beginning of the war the stock of manufactured articles in the country was probably equal to one year's consumption. Military articles, salt, and sugar were at first lacking and could not be supplied from outside sources, so that prices rose exorbitantly. The immediate lack of salt was especially noted. For a time "the best citizens of the country were not ashamed to be seen in clothes of extended use, a patched garment, an overcoat of blanket of their household manufacture." The production of powder, cannon, and military

[45] *Pennsylvania Gazette*, Apr. 3, 1782; *De Bow's Review*, xv, 476, Nov. 1853.
[46] Potter, *Manuscript Account Book*.
[47] McCrady, *History of South Carolina in the Revolution*, 747.
[48] *E.g.*, Chastellux, *Travels in North America*, II, 88 (translators' note); Schuvicht, *History of the German Element in Virginia*, I, 149; Virginia, *State Papers*, I, 486. Heavy importations of indentured servants took place at Baltimore in 1783; Woolsey and Salmon, *Manuscript Letter Book*, Letters to Governor Moore, London, Oct. 3 and Dec. 20, 1783.

stores at once became active, "and particularly iron in all its shapes, as also leather and hats." The manufacture of cotton, wool, hemp, and flax goods increased, and paper and glass were added to the articles largely supplied from local sources. "In short, most of the uses and comforts of life began to receive a decent and beneficial supply before any could be obtained from abroad." He concluded that though there was no tariff on foreign imports, war conditions had the effect of a tariff on home manufactures. A debt of £1,500,000 sterling due to England for merchandise imported before the Revolution was in abeyance. Gold and silver were at first hoarded, so that domestic trading was carried on in depreciated currency; he adds that, notwithstanding these facts,

> "Extreme demand and brisk sale seem to have supplied the place of capital until the revival of commerce brought home supplies of gold and silver. * * * As the war advanced, and particularly after the French alliance in 1778, some markets were opened in France and the West Indies for exports, particularly flour and tobacco, and some supplies were derived by fast sailing vessels and privateers. The trade was attended, however, with so much risk and expense that prices were very high. But those obtained for our new produce became most useful in raising the price at home and reviving cultivation, and those of foreign supplies stimulated the manufacturer. One beneficial effect of the foreign trade, particularly that of the West Indies, was to supply the country with specie, and to this was added the expenditure of the British army, which insensibly circulated through the country. At the close of the war, therefore, English guineas, French crowns, and Spanish dollars were in considerable abundance, the fair result of its industry.* * * During the latter three years of the war the combination of these [brisk demand and sale] with foreign loans and the expenditure of the French and British armies, gave a decent specie capital. * * * Self dependence was indeed one of the inestimable fruits of the Revolution."[49]

MANUFACTURES OF THE CONFEDERATION

The conclusion of peace, while it did not restore all the commercial conditions that existed prior to the war, opened the way for a large importation of foreign merchandise. There was practically free trade. Old business connections between colonial and British houses were easily and quickly resumed. British manufacturers were eager to reënter the American market, which previously had contributed so much to their prosperity; consequently there was a great inpouring of British goods. Prices went down, even below a normal free-trade level, and seemed even lower by contrast with the high prices recently prevailing. Distributors overloaded themselves with stocks; consumers bought extravagantly; both parties burdened themselves with debt. Not only must the new obligations incurred for these goods be paid, but debts owing to British merchants before the war became due. Most of the ready money in the country took wings to Europe and de-

[49] Joshua Gilpin, in McLane, *Report on Manufactures*, II, 840–841.

prived the people of a medium of exchange. Similar crises had occurred in colonial times, especially with the revival of trade at the conclusion of each non-importation agreement, but with differences that Americans at first did not realize. Previously the colonies had been a part of the British Empire. Now with political independence many trade privileges with the mother country and her tropical colonies, which had created and shaped the course of colonial commerce, were lost. Not only were the people of America incurring bigger debts than ever before, but they were not able to market their produce as freely as in the past in order to pay those debts. The advantages of dependence had passed away, and the commercial advantages of independence were not yet experimentally realized. A Canton and East Indian trade, broader intercourse with Europe, the development of commerce with tropical America upon new lines, could not be accomplished in a day.

The political disorganization of the colonies was also a drag upon the reconstruction of business. In some of the States public finance and the currency were in chaos. The total result, after the carnival of trade that immediately followed peace, was a violent business crisis, terminating in a prolonged depression. This condition affected particularly the commercial and industrial commonwealths of the North; for the plantation States now reaped compensation for their recent distress in a wider market than before the war for their rice and tobacco, which were ready-money crops. The British Government, in order to encourage the sale of English merchandise in the United States, continued the policy developed during the colonial period of encouraging the production in America of primary manufactures. American potash, pearl ash, bar iron, and timber continued to be admitted to Great Britain free, although heavily taxed when imported from other foreign sources. Also the duties on pitch, tar, and tobacco produced in the American States were less than those upon the same commodities from other countries. Moreover, American produce imported into the United Kingdom in American vessels was exempted from the alien duty. In addition Great Britain continued the same drawbacks, exemptions, and bounties on merchandise exported to the United States that had existed when they were still colonies.[50] In substance these regulations retained in force most of the trading privileges with the mother country itself which the colonies had enjoyed previous to their independence and placed the United States, so far as commerce with Great Britain was concerned, in the same position as that occupied by Canada and the West Indian dependencies. However, the former privileges were not extended to trade with the British colonial possessions. America therefore lost the profits of its West India commerce,

[50] *Royal Proclamations of May 14 and Dec. 26, 1783*, Public Record Office, *Colonial Office Papers* class 5, vol. 2, *ff.* 15–21, in *British Transcripts*, Library of Congress, 258; Busching, *Die Entwickelung der handelspolitischen Beziehungen zwischen England und seinen Kolonien*, 99.

which were necessary to enable the Northern States to pay for as large a quantity of imported goods as they had consumed prior to the war. Consequently, in spite of the effort of the British Government to retain unimpaired its market in America, the sales of that country to the United States, notwithstanding the growth of population and the heavy importations following peace, declined in declared value over $1,300,000 annually for the first six years after the war as compared with the six years immediately preceding that event.[51]

The crisis of 1783 and 1784 did not affect manufactures in America as seriously as it would those in a modern industrial state. There were no great factories to shut down, no large capitals to lie idle, no numerous bodies of operatives to suffer hardship. However, town artisans and small manufacturers experienced enough distress to create the sentiment behind the New England and Pennsylvania tariff laws of 1785 and 1786. In spite of excessive purchases, the use of foreign goods did not spread far enough from the towns to affect seriously homespun industries. Accounts with spinners and weavers continue to occur on the ledgers of village merchants, for even the influence of a great trade crisis only slowly penetrates the routine of rural custom. In Carolina and Georgia lowland planters relaxed somewhat their pursuit of household industries, which were in any case exotic; but the southern back settlements, which were growing in population and importance relatively faster than the plantation districts, were building mills and furnaces and largely supplying themselves with ruder manufactures, and were already preparing to obtain a place for a time among the largest flour-makers of America.

Moreover, necessity soon forced a general return to the use of domestic goods. American commercial credit abroad was exhausted. Scarcity of currency confined business to narrow circles. Public sentiment approved the patronage of home industries, because they were expected to bring economic independence to the support of political independence. By 1786 business began to recover from its recent prostration, although the price of farm products continued low. This was the time when the cotton and woolen mills of New England and Pennsylvania were incubating, fostered by public care and the organized support of private associations, as well as by the enterprise of venturesome promoters. The predecessors of our first real textile factories, at Philadelphia, Beverly, and Hartford, made some headway. An economic theory of public welfare was developing that included protected manufactures as fundamental to a well-balanced commonwealth. In the same way that the prospect of political independence stimulated domestic industries during the Revolution, the prospect of a Federal

[51] Great Britain, *Report of the Lords of Privy Council on the Commerce and Navigation between His Majesty's Dominions and the Territories of the United States of America*, Jan. 28, 1791, 21; also reprinted by U. S. Dept. State, 10.

Government during the last years of the Confederation gave confidence to manufacturers.

The adoption of the Constitution closes an economic period that began with the passage of the Stamp Act twenty-four years before, when political events exercised a very important if not a determining influence upon manufacturing development. The report of the royal governors in 1768 fairly described the condition of domestic industries at the beginning of this period, and the report of Alexander Hamilton on manufactures described their conditions at its close. Even allowing for the fact that the earlier account may have had a depreciatory bias and the latter one may have been colored by patriotic optimism, the industrial progress of the country had been hardly less remarkable than its political advance. In 1790 the Kentucky settlers were manufacturing a greater variety of things than were the people of New York in 1765. Improved communication and the deepening inland of the frontier were promoting a division of labor among different sections of the country. The low price of farm products that prevailed in the Northern and Central States after the war turned many from agriculture to other pursuits and stimulated emigration to the West. The Genesee country was settled and the migration into Kentucky and Tennessee gained momentum, creating an interior market for coast manufactures. Lack of treaties and of a strong national government and the hostile trade regulations of Great Britain hampered foreign commerce. The Canton and East Indian trade was hardly begun; but a clandestine commerce with the West Indies, in evasion of the monopoly which European nations then maintained over intercourse with their tropical colonies, was sufficiently successful to furnish molasses for New England and Pennsylvania distilleries. However, the conjunction of low grain prices with difficult access to molasses markets hastened the transition to grain distilling. Shipping that otherwise might have been idle found employment in an enlarged coasting trade. The Central States supplied their northern and southern neighbors more abundantly than heretofore with flour and provisions, and this business was accompanied and assisted by an active interchange of manufactures of iron and leather. Already under the Confederation, according to a contemporary observer, Pennsylvania "actually became to a considerable extent the same resource for the furnishing trade to the Southern States that England had been before."[52]

Settlement extended so rapidly into the hardwood areas of the Continent that manufactures of potash increased. Machinery was applied to making nails and cards, causing them to be cheaper as well as better than those imported. The extension of the cultivation of cotton and flax during the war resulted in permanently increasing the production

[52] Joshua Gilpin, in McLane, *Report on Manufactures*, II, 842.

of textile fibers. Such information as had been obtained of the recent improvements in machinery abroad, especially the prominence given to their influence in decreasing labor costs, attracted attention to their probable effect in America, where labor-saving devices had a maximum utility. Efforts to procure such machinery from England, or to secure a knowledge of its principles of construction, and to obtain skilled artificers from abroad, were matters of the most prominent public concern in both countries, and the probability of their success helped to sustain interest in the nascent manufacturing enterprises of New England and Philadelphia.

Mill and furnace industries were reaching the point where they supplied the needs of the country better, perhaps, than later, when a more complex organization of society created highly specialized demands. Rhode Island, one of the chief seats of reproductive metal manufactures, made about all the steel it used within its own borders. By 1790 paper mills and powder mills commanded nearly the entire local market. Agricultural implements, vehicles, and furniture—in short, most heavy articles into the construction of which wood and iron entered largely—were supplied from domestic sources. Glass-making, which had been on a precarious footing before the Revolution, had become established at several points, especially on the upper Potomac and at Albany, accessible to the western settlements.

Pennsylvania was already the home of those economic theories that emphasized the advantage of domestic manufactures and expressed themselves later in a national protective policy. In an address before an assembly of the Friends of the American Manufactures, held in Philadelphia in 1787, Tench Coxe, the leading exponent of these theories, after enumerating several conditions favorable to manufacturing in America, including low cost of living and abundance of raw materials, thus summarized the manufactures already produced in that vicinity:

"meal of all kinds, ships and boats, malt liquors, distilled spirits, potash, gunpowder, cordage, loaf-sugar, pasteboard, cards and paper of every kind, books in various languages, snuff, tobacco, starch, cannon, musquets, anchors, nails and very many other articles of iron, bricks, tiles, potter's ware, millstones and other stonework, cabinet work, trunks and windsor chairs, carriages and harness of all kinds, corn-fans, ploughs, and many other implements of husbandry, saddlery and whips, shoes and boots, leather of various kinds, hosiery, hats and gloves, wearing apparel, coarse linens and woolens, and some cotton goods, linseed and fish oil, wares of gold, silver, tin, pewter, lead, brass and copper, clocks and watches, wool and cotton cards, printing type, glass and stone ware, candles, soap, and several other valuable articles, with which the memory cannot furnish us at once."[53]

Before the Revolution American manufactures had been forced to compete with those of Great Britain and Europe in an almost unpro-

[53] Coxe, *View of the United States*, p. 39; *cf. ibid.* pp. VII-VIII, 22.

tected market; during the war they had benefited by such protection as war hazards afforded, which was generally equivalent to a high tariff; and during the later confederation they had met foreign competition either in unprotected markets or under low customs duties. The industries that maintained themselves or increased throughout these three periods may be considered firmly established; for they had encountered nearly every adverse technical and commercial condition that such political vicissitudes afforded, and their survival was due to natural advantages of which they were not likely to be deprived.

CHAPTER XI

FOREIGN INFLUENCES AFFECTING AMERICAN MANUFACTURES AFTER 1790

European background to American manufactures; periods of manufacturing development before 1860, p. 233. Foreign commerce and domestic manufactures, 236. Foreign competition and American manufactures, 239. Influence of foreign legislation and commercial policies upon our manufactures, 254. Foreign technical progress and American industry, 260.

EUROPEAN BACKGROUND TO AMERICAN MANUFACTURES; PERIODS OF MANUFACTURING DEVELOPMENT BEFORE 1860

In spite of independence, the European background to American industry played as important a part in the development of our manufactures during the nineteenth century as during the colonial period. This was due to influences that appeared for the first time in international economic relations after the industrial revolution in England, and that had their origin in technical progress and new inventions. With mechanical improvements and with the great expansion of secondary production that they inaugurated, came a corresponding development and extension of commercial facilities. These two forces, cheaper and more abundant production, and speedier, surer, and more economical exchange, revolutionized the competitive relations of nations and continents. Though the eighteenth century had witnessed progress in all these respects previously unparalleled, conditions in that or any preceding epoch seem static as compared with the intensely dynamic economic reciprocities of America and Europe during the century that followed. The advent of these new conditions and the fact that they were changing rapidly account for the almost pathological symptoms that accompanied the early growth of our national manufactures and for the various remedies to which the people and the government had recourse for their alleviation.

Those influences which political autonomy brought to bear upon our industrial development operated at first but slowly and uncertainly. National self-consciousness, emphasized by the Revolution and by circumstances attending the formation of a central government, asserted itself, amidst many conflicting interests, in favor of home industries, but neither legislation nor popular good-will could much accelerate the slow processes of economic evolution. The first effect of self-government was to remove certain artificial obstacles to the normal growth of manufactures rather than to give them a posi-

tive stimulus. Independence enabled our industrial pioneers to procure from Great Britain and to use freely the great mechanical inventions of the eighteenth century, that under the old colonial system might have been monopolized by the mother country. As a separate nation we were affected differently by the Napoleonic wars than we would have been as part of the British Empire. But in many respects change of government had hardly more effect upon the channels followed by currents of American production than the shifting boundaries of states and nations have upon the courses of the rivers that delimit their domains.

Therefore, the termination of the colonial period is not as definite a point in industrial as in political history; nor in the subsequent life of the nation does the chronology of industrial progress accord in all respects with the sequence of public events. However, one political episode, the Civil War with the abolition of slavery, embraces so many and so necessary economic implications that it logically concludes an era in the country's manufacturing development. During the period which it closes, primary industries, especially agriculture, were unquestionably dominant in our national economy; the interest of the people was absorbed in problems of production, to the comparative neglect of questions of distribution; manufacturing labor was mostly of native stock; and the frontier, with its unoccupied public domain, continued to exercise unimpaired a controlling influence over investment, wages, and the distributon of population. Very rapidly after the war these conditions were modified or reversed; not by reason of that event, but because the war itself resulted from a shifting of industrial as well as political forces that unsettled the stability of society. It was an earthquake that accompanied the faulting and readjustment of our social structure in response to new economic strains and stresses.

Within the period preceding the Civil War two events mark approximately general changes worthy of record in our manufacturing history. Those dates, about 25 years apart, divide the first 70 years of the Republic into three nearly equal divisions, the first ending with the peace with England in 1815, and the second terminating about 1840, when railways began to exert an important influence upon the distribution and organization of our industries.

Some analogy exists between the effect upon American manufactures of commercial disturbances and wars during the first twenty-five years of the Republic and during the quarter century preceding. The influence of the Embargo and Non-intercourse laws upon domestic industry was somewhat similar to that of the non-importation agreements, and the second war with England reproduced, in respect to manufacturing competition from abroad, the conditions of the Revolution. Without forcing the likeness too far, both were periods of rapidly succeeding crises in American economic life, due primarily to international politi-

cal emergencies, during which strictly normal development was impossible; at no subsequent time have the industries of the United States been so much the sport of foreign contingencies, and in a very real sense the close of this period, rather than its beginning, marks the foundation of our manufacturing independence.

However, during the preceding fifty years progress had been continuous and sufficient in degree to produce a contrast in the influence of similar events at different dates. The isolation of the colonies by the Revolution stimulated homespun industries primarily, and the task it imposed was to supply the first needs of the people and the government; the isolation of the Republic during the period of non-intercourse and the War of 1812 stimulated factory industries, and the vicissitudes of this period and its close affected in the first instance an organized industrial section of society, whose prosperity or depression in turn reacted upon that of the whole people.

During the next quarter of a century foreign influence played a less important part than previously in our economic history. The commercial crises of this period were distinguished from those of our colonial and quasi-colonial days by their greater dependence on domestic causes. A newly risen manufacturing interest asserted itself in political controversy and in government policies so as to engage a large share of public attention. Our staple manufactures began to integrate along lines of organization, production, and distribution suited to the needs of the country. Inland water transportation was developed sufficiently to give access to markets capable of employing larger factories and supporting more highly differentiated manufacturing communities than hitherto had existed. Nevertheless land communication was still expensive and difficult. Power-using manufactures were dispersed among a multitude of village water mills, thus proving their continued dependence on adjacent materials and markets. The self-subsisting farm household remained the typical economic unit of rural America; and homespun industries still supplied a large part of the nation's consumption.

Railway development and technical advances were so closely associated that no mere chance caused them simultaneously to dominate, soon after 1840, the course of our industrial progress. During the previous decade the practical use of coal for smelting had opened the way to a great increase in iron production, lower prices, and the concentration and specialization of mineral industries. About the same time improvements in metal-working tools and machinery, and the use of interchangeable mechanism, made it possible to employ iron for many machine parts that previously had been made of wood. New textile devices added to the quality and cheapness of factory fabrics as compared with the waning household manufactures. More than all, steam transportation, by land and water, brought the products of

distant factories to the mill village and the country farmhouse cheaper than they could be made at home. Therefore homespun industries, though they lingered in isolated localities until the end of the century, ceased to contribute largely to the nation's manufacturing product; and small water mills no longer could compete on equal terms with larger hydraulic plants and steam-driven factories.

Although American industry gradually freed itself from that imminent and almost complete dependence upon Great Britain and Europe that characterized the colonial period, nevertheless foreign conditions continued—as they do even at the present time—to exercise an important control over our manufacturing development. Such external conditions manifested themselves during this period mainly through the medium of foreign commerce, which produced its maximum effect before 1815; foreign competition with American manufactures, which remained a constant influence, but was felt most during business crises, to which such competition in some instances contributed; foreign legislative and commercial policies, which operate through competitive channels but in broader spheres than the one just mentioned; and foreign technical improvements, which America adopted and in some instances bettered. The interplay of economic forces across the Atlantic revealed many conflicting currents. British capital and skill founded and maintained in America industries which British capital and skill in the mother country fain would have stifled. International coöperation manifested itself occasionally as a factor in international competition. Specialized industries abroad sometimes were dependent upon the prosperity of other industries in America. Already, in case of the two English-speaking nations, preliminary intimations appeared of an industrial world comity that only succeeding centuries seem destined completely to realize.

FOREIGN COMMERCE AND DOMESTIC MANUFACTURES

During the Confederation the newly independent States were too weak individually and too loosely allied collectively to maintain themselves upon the sea on an equal footing with older commercial powers. After the formation of the Federal Government, however, the United States enjoyed the same foreign trading rights as other nations. Though these rights were infringed by both Great Britain and France during the Napoleonic wars, as were those of other neutrals, and they were limited by the restrictions which all countries having over-sea possessions at that time imposed upon outside trade with their colonies, the effect of independence was greatly to stimulate and expand the foreign commerce of America. It was towards the extension of this commerce, rather than of domestic manufactures, that the earlier industrial legislation of the National Government mainly was directed. As a result of these favoring influences, reënforced by other conditions later to be

mentioned, between 1790 and 1807 seafaring and trading interests dominated the economic life of the country. This tendency was strengthened by an active demand and high prices for farm produce abroad, which centered popular attention upon agriculture and promoted the exchange of such produce for European merchandise; and by our practical control of the world's carrying trade during the Napoleonic wars. At the same time new elements of foreign competition from the Far East were entering into the complex of influences affecting the growth of domestic manufactures.

The general rise in prices which took place during the first five years of the Republic, and which had a more important direct effect upon agriculture than upon manufactures, was due partly to foreign war demands, but also largely to easier money conditions caused by currency expansion. The volume of American agricultural exports grew less rapidly than their value, and after 1795 both these elements of trade statistics remained fairly constant. Between 1780 and 1790 England had changed from a grain-selling to a grain-buying country, and her West India colonies, especially during hostilities with France, necessarily were provisioned from North America. Though all European powers were making an effort to retain a monopoly of their colonial trade, both commercial expediency and the exigencies of war forced them to relax their navigation laws or to connive at their violation. This opened markets which were very profitable for our merchants and for producers of flour, salt provisions, timber, and naval stores, in spite of the fact that such markets were precarious, sometimes totally interrupted, and always subject to blockade-running risks. Very few secondary manufactures of domestic origin accompanied this current of traffic, partly because of normal competitive conditions, and partly because hostile laws and administrative regulations abroad confined this commerce to a limited number of crude commodities. Milling industries, however, received some encouragement from this source. Though our wheat exports declined from over 1,000,000 bushels in 1790 to an annual average of about 100,000 bushels betweeen 1810 and 1817, the amount of flour we shipped abroad meantime rose from 620,000 to nearly 1,500,000 barrels.[1]

However, during the Napoleonic wars our carrying trade did more than our direct exports to shape the industrial tendencies of the country. Freight profits of American shipping were estimated to range between $50 and $70 per ton annually. From 1795 to 1801 the average net earnings of our merchant marine were supposed to exceed $32,000,000 a year, which alone would pay for more imported goods per capita than the colonists had used prior to the Revolution.[1] The surplus capital of the nation therefore was attracted to vessels rather than to factories. Between 1789 and 1810 American merchant shipping in-

[1] Seybert, *Statistical Annals*, 84, 85; 281.

creased from 202,000 to 1,425,000 tons, all built in the United States.[2] Dockyards hummed with activity; sawmills were busy; rope-walks and ship-fitting establishments of all kinds were well employed. Though the prosperity of the seaports and the expansion of general business carried with them some conditions favorable to diversified industry—especially as they increased the mobility of home productions in exchange—the transport service rendered by Americans for other countries was paid for in traders' rather than carriers' profits, and greatly stimulated the importation of foreign merchandise competing directly with existing or potential American manufactures.

Through their control of the carrying trade American merchants became warehousers and distributors of foreign merchandise to all parts of the world. In 1796 the value of imported wares and commodities reëxported from the United States exceeded that of all the exports of the country three years previously, and during the following decade our shipments of foreign goods frequently were greater than our shipments of domestic produce.[2] American vessels annually carried to the British East Indies about $3,000,000 in specie, to pay for merchandise bought for both American and European markets.[2] Consequently a condition noted in colonial times was repeated: British manufactures were 25 to 100 per cent higher in New York than in England, but East India goods and French silks were cheaper.[3] This constant reservoir of imported merchandise in our coast cities doubtless discouraged attempts to establish competing domestic manufactures. Yet it is an interesting and possibly significant fact that some of the first American essays into new fields of industry after the Revolution apparently were prompted or suggested by such importations.[4]

The Embargo and Non-intercourse acts and the War of 1812 abruptly terminated this era of commercial prosperity. For eight years our foreign trade sank to relative unimportance, and even our coasting trade was sadly interrupted. But with the peace of 1815, American merchants and ship-owners looked forward confidently to the restoration of their former advantages. This illusion was speedily dispelled. European and colonial markets for American provisions and raw materials no longer existed or were greatly curtailed. Other nations, by commercial regulations and special favors, rapidly reëstablished their merchant marines, and competed effectively for ocean freight. The United States still could build ships cheaper than its competitors, and its seamen had no superiors elsewhere. Therefore our carrying trade, while it did not reach its earlier proportions, maintained itself in competition with that of Great Britain and Europe. However, subsequently to the war it did not absorb a disproportionate share of

[2] Seybert, *Statistical Annals*, 317; 93; 289; *cf.* also *id.* 56, and 275 *f.*
[3] Fearon, *Sketches of America*, 42.
[4] *E.g.*, calico printing, see 577–578, *f.*

the capital, the commercial interest, and the productive energy of the nation. Foreign commerce no longer shaped the course of our manufacturing development or limited its progress. On the other hand, in its previous era of prosperity it had created accumulations of capital that afforded the resources for our first large manufacturing enterprises.

FOREIGN COMPETITION AND AMERICAN MANUFACTURES

It is not proposed here to consider that normal competition between the manufactures of different countries which accompanies all international intercourse, but attention will be given rather to those peculiar competitive conditions that characterized, or were thought to characterize, the earlier relations of our infant industries with those of the more developed transatlantic countries. During the first half of the century this competition had an important influence upon our manufacturing growth and was distinguished by features which had not been equally prominent in colonial times and that now have ceased materially to affect us. In considering these it is necessary first to dispose of certain points of business ethics which complicated the contemporary discussion of this subject.

A precise line between fair and unfair competition is exceedingly difficult to establish, even in relation to the domestic market, and is still more hard to define in trade between nations. Personal and local group interests, the influence of business customs differing in different countries and places, misinterpretation of the effects of natural economic advantages as the outcome of deviously designed and subtle policies, all bias our judgment of the methods of foreign competitors. Two additional considerations colored the evidence we have received from contemporary sources as to the nature of manufacturing competition during the earlier half of our national history. The struggle for independence and the subsequent struggle for freedom of the sea had embittered Americans against Great Britain to such an extent that, in spite of many harmonizing influences in the later commercial relations of the two countries, of the advantage of a common language, and of the fact that so many of our domestic industries were founded or carried on by British immigrants, a strong disposition remained to attribute to malicious motives of a semi-political character the effort of English manufacturers to retain their markets in this country. Furthermore, unfair competition was a favorite argument with those who sought government protection for domestic industries and naturally was emphasized to the utmost by these advocates.

That British merchants were conspiring in a fixed policy to suppress American manufactures was first suggested in a letter written in 1791, for the information of Alexander Hamilton, who was then preparing his report on manufactures, by Moses Brown, the pioneer cotton-

spinner of Providence. Brown narrated the unfavorable commercial conditions attending the inauguration of his enterprise. Among these was the cotton crisis in England, when many bankrupt stocks were auctioned to exporters, who sold them in America at low prices and upon very long credits, "doubtless for the discouragement of manufacturing here." These credits, sometimes extending to eighteen months, induced merchants to overstock in the hope of securing a profit during the long period before payment became due. Furthermore, when the market was glutted with actual sales, the exporter piled up in American warehouses more goods shipped on commission. Brown continued:

> "This I am informed by good authority was the policy of the English manufacturers, formed into societies for the purpose, about 10 or 12 years ago, when the cotton business began in Ireland. Agents were sent out in the manufacturing towns in that nation to disperse such goods as were made there at a less price than they could at first be made in order to break up the business."[5]

The context shows that this comment was inspired partly by the hope of securing Federal assistance for the cotton industry. There was in fact so little direct competition between the product of the early New England yarn-mills and imported fabrics that this form of commercial warfare, if ever inaugurated for the specific purpose here suggested, had little traceable effect.

It was not until 1816, when another business crisis in Great Britain accentuated the competition of that country in foreign markets, that the charge of a conspiracy against American industry on the part of English manufacturers again became prominent. This charge was made the more plausible when Mr. Brougham stated in the British Parliament, much to the edification of American protectionists, that "it was well worth while to incur a loss upon the first exportation, in order, by the glut, to stifle, in the cradle, those rising manufactures in the United States, which the war had forced into existence, contrary to the natural course of things."[6]

Many years later a report of Parliament referring especially to the iron trade commented upon the immense losses which British employers voluntarily incurred in periods of depression, "in order to destroy foreign competition and to gain and keep possession of foreign markets."[7] There is little evidence that British manufacturers were accustomed to sell goods in America at a loss during times of normal business prosperity. It probably was difficult at the time, as it is impossible now, to distinguish those forced sales which, in periods of

[5] Letter of Moses Brown, July 22, 1791, in *Hamilton Papers*, Library of Congress.

[6] *Speech of Henry Brougham, Esq., M. P., on Tuesday, the 9th of April, 1816, Upon the State of the Agricultural Distresses*, 24; *cf.* also *Niles' Register*, XLV, 394–395, Feb. 8, 1834.

[7] French, *Iron Trade*, 24 (note).

overproduction, were made to relieve the congestion of the home market, when surplus goods were sacrificed abroad in order to protect domestic prices, from a deliberate policy of underselling foreign rivals even at a loss. While combinations may have been formed in Great Britain for thus flooding American markets, specific evidence of this fact is lacking. Similar gluts of English merchandise had been a periodically reappearing feature of commercial history in the colonies and their continuance during the early Republic requires no special explanation. The ability of English merchants to give long credits, such as had been an established custom of transatlantic trade since its beginning, was a great advantage for British manufacturers, not only as compared with those of America, but likewise in competition with those of Europe. We shall see later that the problem of American factory-owners continued to be throughout this period, as it had been in colonial times, very largely a question of capital and facilities of exchange.

Our manufacturers also accused their British rivals of counterfeiting American trademarks and imitating American goods for the purpose of deceiving consumers in this country and in such foreign markets as our home producers at that time had entered. Cheap imitations, especially of American cotton fabrics, were intended not only to displace but also to discredit the substantial goods, which home-grown cotton, limited technical experience, and the necessity of conciliating a market accustomed to durable homespuns, had made it advantageous for our early factories to produce.[8] Later, when southern cotton mills were occupying the same relative position in respect to the older New England mills that the latter at first occupied in respect to those of England, Carolina manufacturers made almost identical complaints with regard to the methods of their northern competitors.[9]

American industries suffered from a peculiar phase of foreign competition due to commercial practices encouraged by our early revenue laws. When these laws were enacted our merchants had little capital, and even less ready money. Consequently provision was made for granting them credit for duties payable upon imports. The term of such credit ranged from four to twelve months, according to the origin and character of the goods in question, thus enabling the importer to realize upon the latter before he paid his tax to the government. Agents, many of whom were foreigners operating with almost no capital, took advantage of this system to import goods on commission which they sold at auction. As the auctioneer made a profit even though the consignor suffered loss, he had less incentive than a regular merchant to maintain prices. Such consignments were not selected

[8] *E.g., Niles' Register*, XIII, 32, Sept. 6, 1817; XV, 419, Jan. 30, 1819; XLIII, 43, Sept. 15, 1832; *Hunt's Merchants' Magazine*, XXXVII, 764–765, Dec. 1857; *Reports of the Secretary of the Treasury*, VII, 637.

[9] *De Bow's Review*, XXIX, 495–498, Oct. 1860.

with the same regard for normal market demands as those bought on the credit of responsible importers. Therefore, without intention of incurring a loss, British shippers under this system were often forced to make a sacrifice. When in financial stress a foreign manufacturer was able, by consigning to an auctioneer in America, to make a cash sale of his goods which he could not make at home and which might prove desirable in a crisis, even though he received for them less than cost. The system also facilitated passing goods through the customs at an undervaluation, a practice which was a source of constant complaint with American manufacturers. Finally, the auctioneer conducted his business with practically no capital, as the government gave him credit for duties and the consignor for the prime cost of the goods he sold.[10] He carried a few of the overhead expenses of an established merchant, often escaping the payment of even rent and insurance. It was estimated that he could handle merchandise from 7.5 to 10 per cent cheaper than a regular importer. In 1819, in a petition to Congress summarizing some of these objections, foreign manufacturers were said to derive from the auction system the following unfair advantages:

"1st. The certainty of an immediate sale by auction, upon condition of immediate remittances; whereas sale at home would have been impracticable, and the want of the proceeds would probably have been ruinous.

"2d. The benefit of the credit upon the duties, realized in the form of interest, or of active capital.

"3d. The very trifling expenses incurred by the transaction of business in this manner, compared with those which are unavoidable to a regular mercantile establishment.

"4th. The animating prospect of utterly annihilating all attempts at manufacturing in this country."[11]

These untimely and unremunerative sales and the violent fluctuation in prices which they occasioned imperiled the very existence of our manufacturing establishments, which were without the wide commercial connections and the adequate operating capital of their foreign rivals. American manufacturers depended on an immediate sale of their products for money to buy raw materials and to pay their operatives. They might survive occasionally the shock of a precipitately falling market, on account of the prevalence of the truck system and of country barter; but the constant recurrence of such crises, which the auction system either caused or favored, gave a highly speculative character to manufacturing enterprises, discouraged their inauguration, hampered their progress, and in many instances was the direct cause of their failure.

Irrespective of the phases of competition just mentioned, foreign

[10] McLane, *Report on Manufactures*, II, 73, answer 19.
[11] *American State Papers, Finance*, III, 444; *cf.* also III, 168, V, 829.

manufacturers possessed many strictly economic advantages over manufacturers in America. The principal of these were larger capital, cheaper labor, more extensive production, more highly specialized industry, better technical equipment, and in some instances cheaper raw materials. Great Britain combined these advantages in a higher degree than the Continental nations. Nevertheless, during the partial commercial isolation forced upon them by the Napoleonic wars, the countries of Europe had continued to develop and perfect their manufacturing industries. They procured improved machinery from Great Britain and they already possessed advanced industrial processes. When peace finally was declared between England and France, the latter country was making finer woolens and muslins than its rival across the channel. The progress of Continental manufactures during the war had created an industrial interest, as it had in the United States, strong enough to procure high protection for home producers.[12] Consequently the European market was closed to British manufacturers, whose surplus goods therefore pressed the more insistently into the markets of other countries. American factory-owners made little complaint of foreign competition, except from Great Britain and the Orient. The latter, for a short time prior to the War of 1812, furnished many low-grade cotton fabrics for our markets. After 1813, however, these were replaced largely by cheaper and more substantial goods of American production. Our constant competitor at home continued to be Great Britain. At first this resulted from habits of consumption and from trade customs and connections carried over from the colonial period, but the continuance of this competition was due to other causes. England was the leading country that specialized in export manufactures, and its factories produced goods especially fitted for the colonial and American trade. As the largest consumer of American cotton, it held the most favorable exchange relations with the United States. The further industrial advantage that Great Britain derived from its extensive banking facilities and abundant capital can not be too greatly emphasized. These enabled manufacturers to buy raw materials in the cheapest markets and at the most favorable opportunity and, when such materials were turned into finished products, to hold those products for the highest prices and to place them in the most profitable markets. British factory-owners were also able to keep themselves constantly equipped with the most efficient machinery and to undertake costly experiments for the purpose of cheapening processes of production. Their location in the center of a great money market permitted them to draw the utmost profit from temporarily idle funds and to meet expanding and contracting demands for capital at the lowest possible expense.

It was well understood, one hundred years ago, that the labor cost

[12] Choate, *Works*, II, 227, quoting Bischoff, *Foreign Tariffs*.

of production was not always measured by rates of wages. Pioneer manufacturers in New England recognized that their employees did not receive higher money pay than many operatives in the mother country.[13] However, the labor cost of production in Great Britain averaged less than in the United States. One protectionist argument in America was that the British poor rates constituted in practice a subsidy to English manufacturers, which relieved them of the necessity of paying a living wage, because part of the cost of supporting their workers thus was shifted to the community at large. As compensation for this, however, our manufacturers were supposed to enjoy the advantages of lower taxation and of cheaper food for their operatives. The labor advantage of British manufacturers consisted rather in having always at call an ample supply of trained hands, whereas American competitors often were put to great expense to secure competent employees or to instruct untrained workers. The temporary suspension of a factory in Great Britain did not mean the dispersion of all available labor for operating it. A plant could resume operation at any time with a full complement of qualified workmen. In the United States even a temporary cessation of work caused employees to scatter widely in search of other employment, and even to leave permanently the occupations in which they previously had been engaged. Therefore, quite independently of the lower wage-level that prevailed in Great Britain, labor cost was much less than in America. Only where automatic machinery could be used by American manufacturers was the labor element of production approximately equalized in the two countries.

Economies due to large plants and wholesale production, to the concentration of allied industries in a single group, and to the accompanying specialization of particular operations and branches of manufacture, all added to the advantages over America then enjoyed by Great Britain. England's competitive superiority, which in some ways was greater during the first half of the nineteenth century than during the colonial period, was increased further by its recently acquired technical improvements. English manufacturers had the start of those of America in the employment of steam motors and of automatic textile machinery, and their relative superiority in the manufacture of iron and its products was increased by the adoption of coke-furnaces and the puddling process. This made a revolution in the production of iron, to the temporary disadvantage of the United States, almost as great as the subsequent employment of iron and steel for ship-building caused in the maritime rivalry of the two nations.

Any repressive influence of foreign competition upon our manufacturing development as a whole might be broadly measured perhaps by

[13] *E.g.*, Letter of George Cabot to the Secretary of the Treasury, Sept. 6, 1791, in *Hamilton Papers*, Library of Congress.

the character and volume of our imports and exports. Without close analysis, however, as to the effect they represent on individual industries, such facts convey little valuable information. Under the Confederation an absolute decline occurred in our imports from Great Britain as compared with the period immediately preceding the Revolution; but during the ten years following the adoption of the Constitution our annual purchases from England more than trebled, overtaking and passing the growth of population. However, these greater importations did not necessarily imply a corresponding displacement of American manufactures in the domestic market. This was a period of easy bank credit, high profits, and general business expansion, accompanied by a rise in the standard of living and increased consumption of luxuries. Part of these goods also represented capital for development, and the demand for them was incidental to the rapid extension of agriculture and western settlement. But the greatest single element of increase was due to the large amount of merchandise brought to America for reshipment to other countries and was indicative of the broader trade relations that came with independence. Between 1791 and 1800 we reëxported over 35 per cent of the goods that we received from abroad, and the following decade over 39 per cent. These figures include the value of large quantities of West Indian produce landed in America in transit to Great Britain, in order to comply with the navigation laws of that country. This business naturally declined after our war with England and the conclusion of a European peace, conditions which partly account for a fall to 16 per cent in the proportion of goods imported for reshipment between 1810 and 1820. During the following ten years this percentage temporarily rose to 28 per cent, but thereafter consistently declined to 15 per cent, 12 per cent, and 8 per cent respectively during the succeeding three decades.[14]

Our active carrying trade during the first twenty years of the Republic was accompanied by a larger relative use of imported merchandise than during any other period prior to 1850, excepting the six years immediately following the War of 1812. Each inhabitant of the United States, upon an average, consumed imported goods to the value of $8.25 per annum between 1791 and 1800, $9.90 between 1800 and 1810, and but $8 during the next decade—in spite of a temporary rise to $13.50 between 1815 and 1820. Between 1820 and 1830 our annual per capita consumption of imports fell to $5.10, rising during the succeeding period of currency expansion to $8, and again falling to $5.60 between 1841 and 1850. The middle of the century witnessed the beginning of important economic changes affecting the whole business life of the country, which expressed themselves, among other ways, in an expanding import trade. Under the ad valorem tariff of 1846,

[14] Compiled from *Senate* Doc. 71, 62d Cong., 1st sess., 142; and from *Commerce and Navigation Reports.*

assisted by California gold, by good prices and active demand for agricultural produce during the Crimean War, and by the country's rapid internal development, our consumption of foreign goods rose to an average of nearly $9.80 per capita per annum, the highest point yet attained in our history. Part of this increase was due to changing standards of living and part to the inflow of borrowed and invested capital from Great Britain and Europe in the form of railway iron and other development machinery. Though the growth of our population from 1850 and 1860 was only 36.5 per cent, our importations of manufactured and unmanufactured iron and steel during this period exceeded those of the preceding decade by 134 per cent, and our aggregate imports of sugar, molasses, tea, and coffee, rose in value 164 per cent.

However, expressed in average values for ten-year periods, the volume of imports relatively to the population throws little light upon the influence which foreign competition exercised upon American manufactures. Such figures tell more when shown for particular groups of years. In general every financial crisis during the first half of the century was preceded and accompanied by an excessive rise in the per capita consumption of imported goods. We already have seen evidence of this in the great expansion of imports prior to 1819. The depression of 1824 and 1825 manifested itself less emphatically in trade statistics. A provision in the tariff law of 1824, postponing for one year the application of the maximum tariff upon woolens, was partly responsible for heavy importations early in 1825. Between 1834 and 1838 the per capita consumption of foreign merchandise rose to figures not equaled since 1819. Just before the crisis of 1837 it amounted to nearly $11. Similarly, in 1857 importations approached $12 for each inhabitant, again breaking the record since the early panic years of 1815 and 1820.

It is evident, from the known history of our domestic industry, that upon the whole the use of foreign goods in America did not increase to correspond with the rising standard of living, the growing dependence of the people upon factory products, and the extending demand for capital to be used in development. Even the heaviest importations during the era of railway extension did not curtail appreciably the previously existing market for domestic manufactures, though they may have checked the normal expansion of that market.

Early in the century our imports consisted preponderantly of cotton, woolen, and linen textiles. In 1802 and 1803 over 70 per cent of the British merchandise brought to America came under the 12.5 per cent ad valorem tariff, which applied principally to textiles and hardware.[15] In 1806, of the British goods we imported, 45 per cent were woolens, 37 per cent cottons, and 6 per cent manufactured and unmanufactured iron and steel. The proportion of cotton manufactures brought from

[15] Seybert, *Statistical Annals*, 227.

England rapidly rose, our homespun woolens holding their own better against the manufactures of the older country than did cottons and linens. In 1808 approximately half of the British merchandise that came to our ports consisted of cotton goods; woolens had fallen to 35 per cent, and iron and steel and their manufactures to less than 5 per cent.[16] The percentages that these various commodities, singly and in the aggregate, bore to the declared real value of all goods of British origin exported from Great Britain and Ireland to the United States for two groups of years, 1827 to 1830, and 1857 to 1860, respectively, and similar percentages of like goods exported from England alone to the United States for the three years from 1806 to 1808, are presented in the following table:[17]

Percentage of the total exports from Great Britain and Ireland to the United States represented by certain commodities. (British valuations.)

Years.	Cottons.	Woolens.	Linens.	Silks.	Iron and steel (manufactured and unmanufactured).	Total of the five groups.
1806–1808.....	43.1	39.2	.9	3.1	5.4	91.7
1827–1830.....	34.2	21.1	11.8	1.6	2.6	71.3
1857–1860.....	20.2	18.8	9.4	2.6	17.6	68.6

Ratios for the first year-group are not entirely comparable with those for the succeeding years, because of the omission of goods exported directly from Ireland and Scotland; this affected linens particularly. But in default of better figures the percentages are helpful in showing the relative decline of staple manufactures in our imports from the country that supplied most of our foreign merchandise.

Prior to 1820 our trade statistics were so defective that they do not allow us to measure with exactness the tendency here indicated as applying to our imports from all countries. Between 1820 and 1860 textiles were about one-third of our total purchases abroad. Approximately one-fourth of the goods we imported were comestibles, such as sugar, coffee, tea, and wines, and their proportion did not change greatly during this period. The most obvious increase was in manufactured and unmanufactured iron and steel, the value of which rose consistently from 1821 to 1860, though at no time did these articles, for a period of years, exceed 8 per cent of our total importations.

In studying the competitive influence of these foreign manufactures upon domestic industries it must be borne in mind that value measurements were changing rapidly in relation to quantity measurements. For instance, between 1827 and 1830 upon an average we imported

[16] Pitkin, *Statistics of the United States*, 294.
[17] Pitkin, *Statistics of the United States*, 295, 296; *Senate Ex. Doc.* 55, 38th Cong., 1st sess., 46.

annually from Great Britain 3.5 yards of cotton cloth per capita, worth in England about 21 cents a yard. For the corresponding years three decades later we imported 6.5 yards of cotton per capita each year, but the average value per yard was only 8.3 cents. Consequently, though we spent less money for British cotton goods at the later period, we bought nearly twice the quantity. In case of linens, prior to 1830 we imported about 1.5 yards per capita yearly, at an average British valuation of 17.4 cents per yard; thirty years later we imported 1.8 yards, at an average value of 15 cents per yard. In these instances the annual value of our purchases remained practically constant; the cost of the goods did not increase, and the quantity imported continued about the same. A more marked change occurred in case of woolens. During the four years ending with 1830 our annual purchases from all sources were less than two yards for each inhabitant; and the declared real value in Great Britain of those shipped from that country was nearly 35 cents a yard. Thirty years later our per capita consumption of foreign woolens had risen to 3.22 yards, but the average value in England of those of British origin had fallen to twenty cents a yard.[18] Consequently our per capita expenditure for British woolens had decreased greatly, though it had remained nearly constant for the other two kinds of textiles. The decline in value per yard is accounted for in part by the fact that later statistics include light fabrics composed partly of silk or cotton, and a relatively larger proportion of women's dress goods.

The quantity of British cottons we imported fluctuated widely. It was about 2.5 yards for each inhabitant in 1820, about 4 yards in 1825 and 1830, and 5 yards in 1835. After the panic of 1837 importations fell off so rapidly that the average in 1840 was under 2 yards, and in 1845 only 1.5 yards. Thereafter, the quantity increased to 4.5 yards in 1850 and to approximately 7 yards in 1855 and 1860.[19] Not all of this cloth was consumed in America, and were we to average these figures for groups of years some of their irregularity would disappear. But the feature of this trade that particularly affected our manufactures was not so much its average volume as the very fact of these wide variations at different periods.

Behind these irregular movements of foreign trade lie remoter conditions affecting the prosperity of industry and commerce beyond the boundaries of any single country. No important business crisis in America during these sixty years was independent of similar crises abroad. Between 1815 and 1819 Great Britain suffered from bad harvests, idle labor, and overproduction of manufactures; and America experienced its effect. Again in 1825 a speculative crisis occurred in England, accompanied by over-importation of raw commodities. The

[18] Cole, *The American Wool Manufacture*, I, 341 (footnote).

[19] "Account of the Total Quantities and Declared Value of British Cotton Manufactured Goods Exported to the United States, 1815–1847," in Parliamentary Papers, 1847–1848, LVIII, *Document* 383, p. 5; *Annual Statement of Trade and Navigation, in Parliamentary Papers*, 1854–1855, LI, 215 (for years 1849–1853); "Annual Statement of Trade and Navigation," in *Parliamentary Papers*, 1860–1861, LX, 324–325 (for years 1856–1860).

continued fall in prices bankrupted many manufacturers in that country who held large stocks of raw materials or finished goods, and who were forced to sacrifice these regardless of ordinary rules of commercial prudence. American manufacturers felt the result in increased British competition. Between 1836 and 1839 England again suffered from poor harvests. At the same time there was feverish speculation in South American investments and in grain and tea. This resulted in a widespread financial disturbance, coinciding with the financial crisis of 1837 in America. Again in 1846 England was afflicted with bad harvests, overspeculation in grain, unwise railway extension, and the high price of cotton. In this crisis cotton manufacturers particularly suffered; but America, though affected, escaped its more serious effects. The ensuing depression was terminated by gold discoveries in California and Australia. All these periods of business reaction, in so far as they related to Great Britain, originated from causes in which America took little part. However, a severe crisis in the British iron and steel industry, in 1857, which extended gradually to other lines of business, was associated directly with the collapse of railway building and the general commercial and financial depression in the United States.[20]

Foreign crises affected especially the cotton industry, because they reacted immediately on the price of a raw material produced in America as well as upon the price of manufactures shipped to American markets. When the collapse after a period of overproduction and high cotton came, it found manufacturers carrying stocks of raw materials bought at advanced prices, or obligated by contracts for such materials at quotations that made their manufacture unremunerative. Such a reversal of business conditions probably affected British factory-owners more seriously in respect to raw cotton than those of the United States, in proportion as the former and their representatives dealt in larger quantities, upon longer contracts, and through the machinery of a more intricate commercial system. On the other hand, a sacrifice of manufactured goods under the compulsion of these conditions was felt more in America, because the disastrous influence of such sales upon factories coincided with the depression of a staple agricultural industry and our factory-owners could not relieve the home market by selling surplus stock abroad.

Another feature of the influence of foreign competition upon our cotton manufactures at this time was the changing field within which that competition produced its maximum effect. After 1820 this was largely, and after 1830 almost entirely, confined to manufactures of printed and colored cottons and muslins. At an earlier date East India and British plain cloths had controlled the American market. Between 1835 and 1850 France and Switzerland became to some extent

[20] Gibbins, *Industry in England*, 464, 465.

competitors of England in making muslins and other fine cotton goods. In this competition cost of production and skill were not the sole determining influences. American dependence upon foreign fashions and the superiority of European patterns were important factors in increasing the demand for imported fabrics of this character.

The competition of English woolens with those of the United States was conditioned more largely than that of cotton fabrics by British legislation. English manufacturers had a local supply of combing wool sufficient, at least during the early part of the century, to support the worsted industry. No goods of this kind were made at that time by American factories, and consequently, except as worsted stuffs were substituted for other textiles, domestic manufactures were not affected by the competition of those imported from Great Britain. The English woolens that competed immediately with American factories were broadcloths and other carded fabrics. British manufacturers of these goods depended for their raw materials upon imported wool. Until the destruction of the Merino flocks during the Peninsular War this came principally from Spain. After 1820 the immediate source of supply was Germany. In 1803 Great Britain imposed an import duty on wool, which was increased at first gradually, and then, as the result of the agitation of wool-growers for protection, to the extreme rate of 6 pence sterling a pound. The result was a relative decline of cloth manufactures in Great Britain as compared with the Continent.

In 1824 this tariff was lowered radically, and the following year wool became practically free for British manufacturers, though a small duty continued to be levied until 1854. The various taxes upon raw wool did not check a rapid fall in prices, which was halted only temporarily by the brief prosperity of English manufacturers when American markets were opened at the peace of 1815. This decline continued until shortly before 1830, and the preceding years marked a protracted depression of the woolen industry in Great Britain.[21] Foreign factory-owners had the constant prospect of losing more on the material they were using than they received for manufacturing it. This crisis reacted on the American industry by sharpening British competition in our markets.

The first great inflow of woolens was in 1815, at the close of the war, when $20,000,000 worth, English valuation, were shipped to the United States. The following year American imports from Great Britain decreased to about three-fourths, and in 1818 to about one-half this sum, but in 1819 again rose to $15,000,000.[22] Between 1819 and 1822 we imported annually from all countries less than $9,000,000 worth of woolen goods, but in 1822 imports rose to over $12,000,000. Subse-

[21] Wright, *Wool Growing and the Tariff*, 36, 39.

[22] Great Britain, House of Lords, *Journal*, 1828, LX, Appendix 3, pp. 906–913 (for years 1816–1828).

quently, however, our annual purchases fell to nearly their previous level.

The following decade our average consumption of foreign woolens was greater in proportion to the population than it had been prior to 1830, but between 1840 and 1850, not only did our per capita purchases abroad decline, but in spite of our growing population they showed an absolute decrease of over $12,000,000 as compared with the preceding decade. They revived, however, during the ten years immediately preceding the Civil War; so that our foreign purchases during the decade rose to $32,000,000 per annum as compared with $13,000,000 ten years previously.[23]

Meanwhile there had been a change in the sources from which we got our woolen goods, partly due to the greater consumption of mixed and fancy fabrics. Between 1820 and 1830 we received over 93 per cent of our woolens from Great Britain, 4 per cent from France, and slightly over 1 per cent from Germany. Twenty years later we received but 60 per cent from Great Britain, 31 per cent from France, and 5 per cent from Germany. In the decade preceding the Civil War our imports from Great Britain again rose to 65 per cent, those from France declined to 18 per cent, and there was an increase to 13 per cent in our direct purchases from Germany.[23]

The geographical origin of imported manufactures was not shown in our early trade returns. Great Britain as a warehouser and carrier of Continental merchandise therefore received credit in our commercial statistics for supplying many articles which it did not itself produce. It is fair to assume, however, that goods shown to have come directly from Europe were not to any appreciable extent of British origin. We imported more worsteds from France than from any country except England, and France and Germany together supplied us, in the direct course of trade, with about a third of our total importations of this character. The value of woolen cloths imported immediately from the Continent was relatively small until 1850, when France and Germany began to sell us nearly as many of these goods as Great Britain itself, and thereafter furnished one-third to one-half of all our carded fabrics of foreign origin. Although the precedence of British cotton manufactures in our markets was not equally impaired by Continental competition, it is a curious fact that Germany, which shipped us so little cotton cloth, regularly supplied us with far more cotton knit goods than did Great Britain. In some years nearly 75 per cent of our imports of this character were bought from German firms. However, Great Britain constantly furnished us with nearly all the imported woolen knit goods that we consumed. Throughout the period for which we have detailed trade statistics, that is from 1820 to 1860, we imported more silks from France than from any other country.

[23] *House Mis. Doc.* 550, 50th Cong., 1st sess., 36, 50; pp. 36–37.

These fabrics, moreover, formed a very important part of our textile imports, sometimes exceeding in value those of cotton. After 1850, however, we bought in England nearly half the silk piece-goods we imported, although this fact does not certify their origin. In connection with the Canton trade, China sold us silk fabrics to the value of about $1,000,000 per annum. Our silk manufacturers prior to the Civil War were not in a position to supply more than a small fraction of the American market, and consequently these importations had little competitive importance. Turning to iron and steel, our principal imports in point of value were of hardware and cutlery, which we bought almost exclusively in Great Britain. Between 1820 and 1860 we imported unmanufactured iron mainly in the form of hammered or rolled bars. Hammered bars came almost entirely from Norway and Sweden, though Russia occasionally furnished a part of our foreign supply. Until the railway era more than half the bar iron we imported was hammered. After 1850 rolled iron, which from its first introduction to the American market came almost wholly from Great Britain, constituted practically all our imports of this character.[24]

In reviewing these facts of foreign competition in their relation to the growth of domestic manufactures, several important conditions of a general nature need to be borne in mind. First, the displacing agency was the American manufacturer, and not his transatlantic competitor, who was the original furnisher of the American commercial market and who—reënforced by all the advantages of prior possession, good-will, and established interest—was the passive or resisting party in the struggle. British woolens, Irish and Dutch linens, Indian cottons, French silks, Russian duck and cordage, and Swedish iron were familiar and long-tried articles with American consumers, at a time when domestic goods were suspected novelties; yet this must be qualified by the consideration that the old commercial market was not in fact the chief field of competition. The two rivals contended mainly for a new market created by the decline of homespun industries, in which they, so far as precedent and established habit of consumption were concerned, were on more nearly equal ground. Indeed, in this field domestic producers had some advantages, which will be more fully described in later chapters. The limiting force to the expansion of American manufactures during these years, therefore, was to no small degree the resistance offered by household industry to factory production. The earlier development of our textile as compared with our metal-working manufactures is partly due to their natural outlet being to the greater extent in this new sphere of consumption. Meanwhile the farmer, becoming less a manufacturer, was more specially an agriculturalist, demanding market reciprocity for his produce in order that he might purchase the things he no longer made himself. This demand

[24] Summarized from *Commerce and Navigation Reports*, 1821–1860.

for exchange on the farmer's part in turn reacted upon foreign commerce as well as upon tariff legislation, as the relative advantages of markets abroad or at home appealed to his interest or imagination.

Great Britain alone competed seriously with our own manufacturers for command of the territory vacated by household industries. Continental countries could not manufacture the class of goods this field of consumption demanded as economically as could Americans. Therefore, the rise of imports from Europe during the later decades of the period we are considering did not involve the same kind of competition that our factory-owners met from Great Britain. France and Germany competed for the old commercial market, among the consumers of luxuries in towns and cities, which indeed domestic manufacturers already were supplying to an increasing extent, but which did not form the foundation of their prosperity.

According to the incomplete census returns of 1810 the estimated value of domestic cloth made was nearly equal to our aggregate imports under the 15 and 17.5 per cent tariff clauses, which included not only textiles but many other articles.[25] The amount of woolen cloth manufactured in families was over 9,500,000 yards. At that time the factories of America were producing less than 4 per cent of the woolen goods made in the country.[26] Our imports from all sources at this time were probably between 4,000,000 and 5,000,000 yards per annum, or possibly treble the amount per capita that we imported twenty years later.[27] In addition, nearly 65,000,000 yards of cloth, made principally of cotton, flax, and hemp, or a mixture of these fibers, were manufactured in American households.[28] This would provide about double the quantity of cotton and linen cloth per inhabitant that we imported in 1830.[29] Even without allowing for the fact that at the later date each inhabitant probably used more factory goods, on account of their low price, their lack of durability, a rising standard of living, and the influence of fashion and caprice upon consumption, than he had used family-woven cloth in the era of homespun, it is obvious that foreign competitors had not occupied a large share of the market vacated by household industries.

Meanwhile American manufacturers met foreign competition in markets outside the United States; for they were shipping abroad cotton goods, leather manufactures, and machinery, as well as flour, lumber, naval stores, and other productions for which our country possessed superior natural advantages. But this foreign market did not to an appreciable extent determine the growth or the welfare of our manufacturing industries, and the conditions attending its origin and extension will be considered elsewhere.

[25] *American State Papers, Finance,* II, 691; Seybert, *Statistical Annals,* 165, 169.
[26] *American State Papers, Finance,* II, 691.
[27] Pitkin, *Statistics of the United States,* 294, 295.
[28] *American State Papers, Finance,* II, 690.
[29] Pitkin, *Statistics of the United States,* 205.

Viewed from a broader outlook over international economics, during the first half of the nineteenth century the rapidly rising demand of the civilized world for luxuries and manufactured goods normally employed the entire productive energy of all nations contributing to their supply. Cross-currents of competition here and there existed, detrimental to one country or section at the expense of another. Obstacles to intercommunication still were sufficient to prevent so ready a mutual adjustment of international supply and demand as we enjoy at present. Inexperience with the new and powerful productive agencies which steam and machinery had placed at the service of industry periodically caused a surplus output of manufactures that even the growing world-market could not immediately absorb. These last evils—defective trade information and imperfect control of production—assisted to some extent by artificial interference with courses of exchange due to old theories of international competition, were the chief hostile influences from abroad that checked the normal growth of domestic industries. It was not the average pressure of foreign competition, but the temporary relaxations and excesses of that pressure, that affected our manufacturers adversely.

INFLUENCE OF FOREIGN LEGISLATION AND COMMERCIAL POLICIES UPON OUR MANUFACTURES

In considering the influence of foreign legislation and commercial policies upon our manufactures, Great Britain is again the only country to which we need seriously direct attention. An important part of our export trade continued to be either to that country or to her American possessions. From England itself we derived most of the technical improvements and no small part of the capital upon which our own industrial growth depended. The favors or restrictions which the same nation applied to its own manufactures affected directly their competition with those of the United States.

Direct commerce between America and the British Islands reacted upon our industries in two ways: by creating an outbound traffic in cotton, grain, provisions, and forest products, which aided the return of British merchandise in payment; and by fostering the prosperity of agriculture in the United States, which competed for capital, labor, and legislative favor with other local industries. During the colonial period, it will be remembered, the balance of exchange with the mother country was unfavorable to her North American possessions, especially to the New England and central colonies. British tariffs on raw materials, and on grain and provisions, intended for the protection of her own mining and agricultural interests, accentuated this unfavorable balance, and to that extent discouraged the importation of manufactured goods from that country. The West Indian trade only enlarged this circle of exchange. Consequently restrictions on the commerce of the

United States with the British colonies not only hampered the direct sale in those markets of such American manufactures as we could supply more cheaply than the mother country, but lessened the ability or incentive of our merchants to buy goods directly from Great Britain in order to take up credits created by traffic with her tropical dependencies.

We have already seen the important part that the West India market, and especially the demands of the tropical colonies of Great Britain, had played in the industrial development of the North American colonies. One of the most important commercial problems that presented itself when the independent States took measures to readjust their trade relations with the mother country was the future regulation of this traffic. The Royal proclamation of May 14, 1783, permitted American products, except oil and manufactured articles, to be imported into England under practically the same conditions that had existed prior to the Revolution. The point now arose whether Great Britain could be induced so far to modify her old colonial system as to grant equally comprehensive privileges in the West Indies. An active and influential party in Great Britain strongly advocated this policy, which not only was sought urgently by American representatives, but was supported strongly by both commercial and official sentiment in the colonies affected. However, a party led by Lord Sheffield and supported by the commercial writer Chalmers, which favored the traditional policy of commercial restriction, gained the day. In July 1783 an order of council forbade the importation of timber, naval stores, provisions, and breadstuffs into the West Indies, except by British vessels, and prohibited entirely the importation of salt meats, fish, and oil from the United States. One object of this order was to break up an active trade in British manufactures with the English colonies, carried on in American vessels via the United States. The violent opposition of the colonies to this restriction upon their trade and market, supported by differences of opinion in Great Britain as to the wisdom of this policy, caused a speedy amendment to this order, which opened the trade of the West Indies to American vessels and for American produce except oil and manufactures.[30] However, this was followed again, in 1788, by an act of Parliament which practically limited trade between the islands and the North American Continent to British vessels, though it permitted the importation into the West Indies of timber, naval stores, provisions, and breadstuffs produced in the United States.[31]

The outbreak of the war between England and France, in 1793, deprived the British manufacturers of a market amounting to about

[30] *Royal Proclamations of July 2 and Dec. 23, 1783.* *Cf.* Great Britain, *Acts of Privy Council, Colonial*, 1766–1783, Ser. v, 527–532.

[31] 28 George III, Chap. 6.

$6,000,000 annually in the latter country.[32] Moreover, the maritime supremacy of Great Britain was not sufficiently assured to enable the government to count with confidence on its own ability to provision its West Indian colonies. A desire to conciliate the United States, to secure so far as possible a compensating market in America for the one just lost in Europe, and to provide for the needs of her tropical colonies in case her own commerce was interrupted, induced England to modify the restrictions previously imposed on American commerce with the West Indies. These changes were embodied in the Jay treaty of 1794, which permitted the United States to traffic freely in its own products with the English islands and to carry tropical produce from those islands directly to its own ports on practically the same conditions as those granted British vessels.[33] The only limitation to this privilege was that American vessels engaged in this trade should not exceed 70 tons burden. This treaty was not satisfactory to the United States, and was not ratified until 1796, yet its provisions continued to regulate our commerce with the British West Indies until after the peace of 1815. The influence of these commercial regulations upon American industries was twofold. They opened a market for primary manufactures, such as lumber, naval stores, and flour, and also for such secondary manufactures as boots and shoes, machinery, agricultural implements, and cabinet wares. On the other hand, they facilitated somewhat the importation of raw sugar for refining, of molasses for distilling, and during the first years of cotton for spinning. Nevertheless, this commerce did not for a considerable time attain the volume it had prior to the Revolution.

Our commercial treaty with England after the War of 1812 stipulated that each nation should, in respect to ship regulations and customs duties, enjoy the same privileges as the most-favored nations in the other's ports and markets. But these provisions did not govern commerce between North America and the British colonies. Each country retained the right to regulate that commerce as it saw fit, though the treaty expressly provided that produce carried from those colonies in American vessels should not be transported to any other place than specified harbors in the United States.

The general commercial restrictions which Great Britain imposed upon our West Indian trade by this treaty did less to curtail our direct market for certain manufactures in those quarters than to limit our inducement to buy other goods from England itself. By compelling the traffic between North America and her tropical islands to be self-contained, and thus confining our carrier's profits on that trade to the shortest haul, Great Britain lessened both the means and the conveniences we possessed for buying her own manufactures. Had our ships been free to convey colonial produce to Europe, many a homing

[32] Macpherson, *Annals of Commerce*, IV, 262, 332.
[33] *Cf.* Bemis, *Jay's Treaty*, Chap. II.

vessel would have come laden with British merchandise, that under the existing system carried the returns for its original cargo of lumber and provisions back to America in the form of sugar for our refiners and molasses for our distillers. Of more immediate consequence, especially in their effect on certain primary manufactures, were the discriminating duties which Great Britain at once imposed against lumber, flour, provisions and other articles imported directly into her West Indian islands from the United States. This was in order to encourage Canada and the maritime provinces to furnish these commodities to their sister colonies. But Canada did not have the population and resources to become an adequate granary and lumber yard for Britain's tropical possessions, which continued to depend, though in a lessened degree, upon our own producers. So imperfect was the adjustment of these tariffs for the different colonies, that American lumber was shipped first to Halifax or St. Thomas, for transshipment to the British Islands, and other commodities from America reached their ultimate consumers by routes equally indirect.[34] The mother country discriminated in her own favor in the duties she enacted for her colonies upon textiles, iron, and other articles of her own production; but America could not have competed with England in respect to these manufactures in any case, and the disadvantage, if any, that we suffered under these enactments was mercantile rather than industrial. It was not until 1843 that a lowering of the tariff on flour from 5 shillings to 2 shillings a barrel, and upon leather manufactures from 30 to 7 per cent ad valorem, encouraged a greater exportation of those articles to our former tropical customers.[35] Consequently, after 1845 our British West Indian commerce resumed some shadow of its early importance, though during the intervening years the prosperity of those colonies had declined and our domestic demands had expanded relatively to the island market so as to make the latter comparatively unimportant. Cuba, Porto Rico, Haiti, and the Spanish American republics now presented fields of more interest to American manufactures and merchants.[36]

Great Britain had restricted our trade with her colonies in order to favor her shipping rather than her factories. The fostering intent of her navigation acts, however, as qualified by the treaty of 1815, was partly nullified by commercial conditions that made the application of identical laws and regulations by England and the United States relatively more favorable to our own vessels, and that in some degree may have promoted the importation into America of Continental rather than British manufactures.[37] Under the treaty neither country

[34] Busching, *Die Entwickelung der handelspolitischen Beziehungen zwischen England und seinen Kolonien*, 109; Buchanan [Pennsylvania], Speech in U. S. House of Representatives, in reply to Mr. Sprague, on hemp and molasses duties, 1828.

[35] Busching, *Die Entwickelung der handelspolitischen, Beziehungen zwischen England und seinen Kolonien*, 226.

[36] *Senate Ex. Doc.*, 38th Cong., 1st sess., No. 55, pp. 28, 29.

[37] Busching, *Die Entwickelung der handelspolitischen Beziehungen zwischen England und seinen Kolonien*, 108; McCulloch, *Dictionary of Commerce*, 852.

could impose burdens upon the vessels of the other power entering its harbors greater than those imposed upon its own vessels in the other's ports. It was a general principle of the British navigation acts to prohibit the importation into Great Britain in the vessels of another nation of products originating outside that nation's dominions. We have just seen how this principle was enforced to prevent American ships from carrying West Indian produce to England. The reciprocal application of this provision by Great Britain and the United States prevented British ships from carrying other than British merchandise to America. As east-bound cargoes from our ports generally were confined to our own bulkier produce, while cargoes from across the Atlantic were made up from various European sources, it was easier for an American than for an English vessel to complete a lading in Great Britain, although that country was a warehouse for commodities from all parts of the world. Moreover, competition for freights of British merchandise being keener, American vessels had an inducement to take on goods from other sources, either at English ports or at European points of call.[38]

Colonial experience had shown that an unfavorable balance of trade lessened the use of British manufactures in America. It is reasonable to assume that the same rule applied to our consumption of foreign merchandise after we attained independence. An unfavorable trade balance with England, that had begun about 1740, was accentuated after the Revolution and continued until about 1840.[39] This balance would have been still more to our disadvantage had it not been for the growing consumption of cotton in England, which reëstablished an economic relation between the South and that country that had been weakened by the decline of the tobacco industry. During the first decades of the Republic, as we have seen, the profits of our carrying trade and general over-sea commerce enabled us to buy freely in any foreign market. But after 1815 this condition no longer existed, and our ability and disposition to purchase goods from Great Britain were determined very largely by the amount that country was willing to buy from us. The heavy duties imposed on our grain, flour, and provisions by all the industrial nations of Europe limited their opportunity to sell their manufactures in our markets. Consequently the repeal of the corn laws in England, in 1846, following upon preceding reductions in duties upon American produce, caused a marked expansion of trade between the two countries in both directions, and accounts in no little part for the rapid rise in our importations of manufactures that accompanied that event. After the repeal of the

[38] "Speech of the Rt. Hon. W Huskisson in the House of Commons," May 12, 1826; Busching, *Die Entwickelung der handelspolitischen Beziehungen zwischen England und seinen Kolonien*, 134. France refused to enter into a similar commercial treaty with the United States for reasons based on these conditions; Holmes, *An Account of the United States of America*, 217–218.

[39] *Cyclopedia of Commerce*, I, 875.

corn laws, our exports of flour to England rose from the neighborhood of $1,000,000 per annum to$ 15,000,000 for 1847, and to an average of nearly $6,000,000 for several years thereafter.[40] In part, this was due to bad harvests abroad and to the rapid agricultural development that accompanied railway expansion in the West. However, that development in turn was encouraged by the change in Great Britain's fiscal policy.

Parliament at various times imposed on raw materials duties that affected American trade and perhaps more remotely England's ability to compete with our manufacturers. Until 1845 a duty was levied on cotton from the United States, which increased slightly the cost of British fabrics and at first fostered in the South a sentiment in favor of protecting northern mill-owners in order to encourage the home market for that product.[41] The high duties on wool earlier mentioned seriously hampered cloth manufactures in England, and the radical lowering of those duties in 1824 was interpreted in the United States as designed to counteract the effect of the higher tariff on woolens we imposed the same year.[42] In 1831 British calico-printers were relieved of heavy excise previously laid upon their products.[43] The extension of the industry that resulted may account in part for the sudden rise in value of our imports of English prints, from $3,553,509 in 1830 to $7,701,104 the following year; and also for the increasing ratio that printed and colored cottons thereafter bore to the white goods we bought from England.[44]

The general effect of free food and free raw materials upon Great Britain's manufacturing supremacy, and the consequent influence of her competition as compared with that of other countries upon our own manufactures, is too indefinite and too difficult of precise definition—we might possibly add too much a matter of theoretical controversy—to repay discussion. Attention might be called, however, to the fact that after 1840 the protectionist nations of Europe sold us relatively more manufactures than earlier in the century. Whether this proportion was greater or less than it would have been had England retained her former tariffs is a matter of very insecure conjecture.

While England became a free-trade country before 1850, and discarded her navigation act and her ancient restraints on colonial commerce, and while these new policies found some response among Continental nations and in America itself, the first half century of our industrial independence was passed in an atmosphere of interna-

[40] *Commerce and Navigation Reports.*

[41] Bain, *History of the Cotton Manufacture*, 326–327.

[42] *E.g.*, Davis [Massachusetts], speech in U. S. House of Representatives, Mar. 12, 1828; *cf.*, however, Stevenson [Pennsylvania], speech in U. S. House of Representatives, Mar. 5, 1828.

[43] Bain, *History of the Cotton Manufacture*, 328. Note that between 1783 and 1813 this excise was remitted and that a bounty was given in addition on printed cottons exported; 23 George III, Chap. 21, quoted by Bain, 329.

[44] *Commerce and Navigation Reports.*

tional restrictive legislation. The intent and spirit of such restrictions was nowhere evidenced more clearly than in the British acts to prevent the emigration of skilled artisans and the exportation of machinery and machine designs. In 1765 the emigration of trained operatives was prohibited.[45] An act passed in 1774, and in operation until 1845, forbade the exportation of textile machinery, plans, or models.[46] In 1781 a law was passed to prevent carrying out of the Kingdom any utensils required for the manufacture of wool or silk.[47] In 1782 artificers in printing calico, muslin, or linens, or in making machinery used in their manufacture, were forbidden to leave the Kingdom.[48] This act was extended in 1785 to include workmen and tools employed in the iron and steel manufacture;[49] and ten years later was made perpetual. By a statute passed in 1789 even coal-miners were prohibited from emigrating to other countries. Manchester supported a private society whose object was to prevent the exportation of machinery. However, these measures did not prevent, or seriously hamper, our acquiring England's more important technical improvements. As in colonial times, new arts continued to be established in America by skilled artisans from Europe. Immediately after the Revolution England was agitated over the efforts made by its former colonies to encourage the immigration of British manufacturers. The existence of this legislation irritated Americans and possibly did more to stimulate their efforts to obtain machinery and artisans from abroad and to induce adventurous apprentices voluntarily to leave England than it did to check the movement of new arts and machinery across the Atlantic. In any case, the effect of these laws was not permanently detrimental to the progress of manufactures in this country.

FOREIGN TECHNICAL PROGRESS AND AMERICAN INDUSTRY

Our manufacturing development owes more to the technical progress of Europe, which the maturer conditions of production abroad accelerated, than to any other foreign influence. The results of this progress were borrowed readily by America, though they might not have originated in so new a country. Power spinning and weaving were the inventions of a land where textile industries were more highly specialized than American conditions at the time permitted. The use of coal and coke for smelting iron, and of puddling-furnaces and rolling mills, were processes responding to the requirements of a country where woodlands already were scanty and where large markets and easy transportation called for wholesale production. The use of chemicals in dyeing, and other applications of science to industry, had

[45] 5 George I, Chap. 27.

[46] 14 George III, Chap. 71; Hayes, *American Textile Machinery*, 6–10, Wright, *Wool Growing and the Tariff*, 42. An exception was made of wool cards, which were allowed to be shipped to the American colonies; 15 George III, Chap. 5.

[47] 21 George III, Chap. 37.

[48] 22 George III, Chap. 60.

[49] 25 George III, Chap. 67.

their natural beginning in old communities, possessing ancient institutions of learning, ample capital for experiments, and a market for luxuries. So dependent were some inventions upon industrial and economic conditions not then existing in America, that certain of those chanced upon by our own manufacturers were not utilized practically until they had been introduced or reinvented abroad. An American patent was issued for the use of the hot-blast to smelt iron with anthracite coal, three years before the Welsh iron-master, whose process later was introduced in America, made his first experiments in Great Britain. Some years before Bessemer perfected in England the method of making steel which now bears his name, William Kelly, a Kentucky furnace-owner, successfully applied at his works the principal feature of this process, that of decarbonizing molten iron by blowing air through it, thus manufacturing forging-blooms and boiler-plates directly from the ore; but he and his associates possessed neither the commercial inducement nor the special technical experience that England then afforded to evolve from this process a method of manufacturing steel. Outside of iron-making, however, really valuable ideas originating in this country seldom had to wait upon foreign enterprise for their successful application to the practical requirements of industry.

On the other hand, America was prepared to welcome most foreign mechanical improvements. The high price of labor, our rapidly growing market, our high standard of living, and the natural mechanical aptitude and intelligence of our native working-people, all contributed to create a demand for labor-saving devices. After the first suggestion of an invention was received, provided it responded to the needs of the country at the time, it was usually improved, and in our hands not infrequently became almost a new development. After the introduction of Arkwright machinery and the Watt steam-engine, which might not have originated independently in America for many decades, the young Republic was well speeded towards industrial self-sufficiency. If after those two acquisitions it had been isolated for a half century from transatlantic influences, its manufactures by no means would have waited upon a resumption of intercourse for a continuance of their technical progress. Yet, as a matter of history, British industrial technique was during this period constantly so far ahead of that of the United States that our manufacturers always were in the position of learners from the older country.

To illustrate the truth of this, it is only necessary to enumerate a few items of our indebtedness to England and Europe at this time. A hand-jenny and imperfect carding-machinery had been imported before the Constitution was adopted. Slater brought us the first complete Arkwright machinery for manufacturing cotton yarn, and the Scholfields introduced power carding and the elementary spinning-machinery

of our primitive woolen-mills. The power loom was an American invention, but it may have been suggested to Lowell by machinery seen in England. A British loom almost immediately competed in this country with the one of native design, and ultimately some of the distinctive principles it embodied were universally adopted. Calico-printing from cylinders was brought from Great Britain, as was the earlier block-printing, together with chemical bleaching and modern processes of dyeing. Lowell manufacturers brought from England the superintendents of their printing works, and in evasion of British laws imimported improved machinery from that country. Automatic mules were introduced from England, though American inventors were in the way of developing their own system of mule-spinning when this happened.

Turning to the manufacture of metals, we borrowed from abroad the puddling-furnace, the rolling mill, the hot-blast furnace as finally developed, those methods of steel manufacture that preceded the Bessemer process, and much of the technique of our earlier furnace practice. France suggested to us the turbine-wheel, and sent us our first manufacturer of improved gunpowder. From the same country, indirectly, we received the continuous process of making paper, though an American inventor shares this field. How far certain typical American inventions, like the sewing-machine, were due to suggestions offered by earlier experiments in Europe, it never will be possible to determine. Meanwhile, many less prominent industries continually received hints of improvement from abroad or were established and perfected by foreign-trained workmen.

Nevertheless, no feature of this apprenticeship of our manufacturers to those of the Old World was more characteristic than the originality of the learners. This was no period of mere passive borrowing and painstaking imitation of the achievements of maturer industrial countries. Foreign inventions were assimilated as readily as foreign populations, and were speedily transformed into the machinery of a truly native system of production.

CHAPTER XII

DOMESTIC POLICIES AND LEGISLATION AFFECTING MANUFACTURES

State and local legislation, 263. Influence of Federal policies and legislation upon American manufactures, 268. Tariff laws from 1789 to 1816, p. 270. Tariff laws from 1816 to 1833, p. 274. Tariff laws from 1833 to 1860, p. 279. General influence of a protective policy on manufactures, 283. Duties on raw materials, 287. Specific and ad valorem duties, 306. Influence of the tariff on market stability, 308. Patent legislation, 312.

STATE AND LOCAL LEGISLATION

Only gradually did the States relinquish to the National Government the function which they had exercised as colonies of encouraging local manufactures. Inspection laws guaranteeing the quality of flour, tar, nails, potash, and provisions were reënacted by State legislatures in terms almost identical with those employed by the colonial assemblies. Assistance from the public treasury was sought for new industries and sometimes was granted by local governments in the form of monopolies, loans, lotteries, or bounties.[1] It was customary, especially in New England, to exempt from taxation during the early years of their establishment property used for manufacturing enterprises. So generous were the States in this respect that their action occasionally aroused protests from the towns in which such factories were situated.[2] Conservation policies were unknown, and the small water-powers developed, being seldom on navigable rivers, were controlled by riparian owners. Government aid and private encouragment coöperated to support numerous agricultural societies and State and county fairs, which fostered household industries and manufactures by prizes and premiums.[3] Some governors advocated in their messages more extensive State aid to manufactures than actually was granted. Such recommendations, however, were not accompanied by a definite program for legislation and could not have been realized without increasing taxes.[4]

[1] *E.g.:* Nails, Massachusetts, *Laws and Resolves*, 1790, *Acts*, Chap. 41. Cotton, *id.*, 1788, *Acts*, Chap. 43; *id*, 1796, *Resolves* (May session), Chap. 5; White, *Slater*, 294–296; Bagnall, *Textile Industries*, 487. Glass, Massachusetts, *Laws and Resolves*, 1793, *Acts*, Chap. 3; *cf.* also Bentley, *Diary*, II, 28, June 7, 1793.

[2] Bagnall, *Textile Industries*, 252.

[3] Wright, *Wool Growing and the Tariff*, 21–22; North, "New England Wool Manufacture," in National Association Wool Manufacturers, *Bulletin*, XXIX, 257, Sept. 1899. *Cf.* Logan, *Letter to the Citizens of Pennsylvania on the Necessity of Promoting Agriculture, Manufactures, and the Useful Arts.*

[4] *E.g.*, Delaware, *House Journal*, 1807; New York, *Senate Journal*, 1811, 5; *Assembly Journal*, 1825, 12; Vermont, *Assembly Journal*, 1823, 11.

Although a strong prejudice existed in many quarters against factory industries as detrimental to the welfare of the working-people, little effort was made to remedy these conditions by legislation. In 1813 Connecticut passed a law requiring factory-owners to cause all children in their employ to be taught to read, write, and cipher, and directing town selectment to visit periodically manufacturing establishments within their jurisdiction to see that the law was enforced.[5] This act is said to have been recommended to the legislature by General David Humphreys, previously United States minister to Spain, and proprietor of cotton, woolen, and paper mills at the village which bore his name.[6] If so, its provisions may have been suggested by the first factory law of England, passed in 1802, and doubtless familiar to General Humphreys, who visited the manufacturing districts of that country. It is more probable, however, that the the origin for this legislation is to be found in earlier acts defining the duties of masters and guardians to apprentices. In 1810 the legislature of Connecticut had embodied a clause in the charter of the Middletown Manufacturing Company, requiring the directors to procure schooling for all children in their employ in reading, writing, arithmetic, religion, morals, and manners, "as is by law directed to be taught in other schools for at least three months in each year."[7] The first general corporation law of New Jersey, passed in 1816, required the managers of factories incorporated under the act to have the children employed by them instructed in reading, writing, and arithmetic, one hour each day, to give due attention to their morals, and to require them to attend church on Sunday.[8] President Dwight, of Yale, is authority for the statement that the Connecticut act of 1813 was observed by the magistrates of Humphreysville; but there is evidence that it remained a dead letter elsewhere.[9] No further legislation of this character was attempted until 1836, when Massachusetts, followed by several other New England and Central States, passed acts to control or prevent the employment of very young children in factories and to provide for their instruction.[10] These laws were a by-product of the recently awakened interest in public school reform, reënforced by information of abuses in England revealed by Parliamentary inquiries preceding the British factory law of 1836. They were not extended at this time to include public inspection or regulation of factories, and did little to influence general manufacturing conditions.[11]

[5] Edwards, *Labor Legislation of Connecticut*, 4–5.
[6] Dwight, *Travels*, III, 391–394.
[7] Connecticut, *Acts and Laws*, 1810, Chap. II, 12; *Bagnall Papers*, II, 1216.
[8] Field, *Child Labor Policy of New Jersey*, 9.
[9] Dwight, *Travels*, 393; Edwards, *Labor Legislation of Connecticut*, 5.
[10] Law of Apr. 16, 1836, in Massachusetts, *Laws of the Commonwealth* (Boston, 1836), Chap. CCXLV.
[11] Accounts of early attempts to legislate for the education of factory children are given in Towles, *Factory Legislation of Rhode Island*, 5–23; and in Barnard, *Factory Legislation in Pennsylvania*, 1–17.

The legislation heretofore mentioned neither created new industries nor promoted old ones. We can not point to a single instance, prior to 1860, where the intervention of a State government directly to encourage or regulate industries left permanent results in our manufacturing history. On the other hand, a very real influence was exerted by general commercial and corporation laws. To be sure, this branch of legislation in each State was determined by antecedent business conditions; but this does not affect the fact that such laws were in themselves a persistent influence in shaping subsequent industrial development.

In 1741 Parliament had extended to the colonies the British "Bubble Act" of 1720, which made unincorporated joint-stock companies unlawful. As the colonial governments themselves were founded upon charters which conveyed valuable rights to the colonists, both public and legal opinion in America supported the English view that a corporation charter was a contract, which could be revoked or changed only by the consent of the grantees as well as the grantor, and which conveyed broad implied powers to its recipients. Consequently granting corporate privileges to private associations was not popular, was very rare, and as a rule was surrounded by many cautions.[12]

After the Revolution, when there was no longer a political motive for emphasizing the inviolability of charters and when economic motives peculiar to a new country encouraged a more liberal policy regarding them, the American conception of a corporation rapidly diverged from what had been the colonial and continued to be the English view of such organizations. State legislatures, first by special acts and later by general statutes, granted specific rather than general corporate powers to particular groups of individuals, for carrying out either public or private objects. Under the influence of this legislation the common-law conception of a trust element in corporation charters disappeared and the implied powers which they conveyed were greatly curtailed. The personality of the corporation, as distinct from the individuals composing it, was emphasized, especially when such bodies, organized under the laws of one State, were granted the privilege of conducting business within the jurisdiction of other States. These variations from the older conception of corporations, especially the definition and limitation of their powers, removed many of the earlier objections to issuing charters to private companies.

General laws regulating religious and charitable corporations were passed in New York in 1784, in Delaware in 1787, and in Pennsylvania in 1791.[13] At first charters for business purposes were granted only

[12] Baldwin, *Private Corporations*, in Yale Law School Faculty, *Two Centuries Growth of American Law*.

[13] New York, *Laws of the State* (Albany, 1886), 1784, Chap. 18; Delaware, *Laws of the General Assembly*, January-February session, 1787, 10–14; Pennsylvania, *Statutes at Large*, XIV, 50, Chap. MDXLVII.

by special statute. The earliest companies so organized were for building roads, bridges, and canals, and for conducting banks and insuring property. However, in 1789 Massachusetts incorporated the Beverly Cotton Manufactory and prior to 1800 gave like privileges to three other industrial undertakings.[14] Connecticut, New York, and New Jersey also incorporated manufacturing companies before the end of the century.[15] In 1799 Kentucky chartered a body of trustees for promoting manufactures and endowed them with 6,000 acres of public land.[16] None of these enterprises was very successful and only one or two projected large outlays of capital. Some combined objects of public welfare and private profit.

A new impulse was given this branch of legislation, between 1807 and 1818, when the country first engaged extensively in manufacturing. During the period of non-intercourse and war, Massachusetts alone incorporated by special acts about ninety companies for making cotton and woolen goods.[17] At this time such undertakings were highly speculative and large individual capitals were rare; so money for these enterprises would have been found with difficulty under any other system. The numerous applications for charters created a demand for a simpler way of authorizing them. Therefore some States passed general statutes, delegating to State officials authority to issue certificates of incorporation to companies, subject to the provisions that had come to be embodied more or less uniformly in private laws. New York passed such an act in 1811, under which five or more persons might be licensed to engage as a corporation in manufacturing. This law continued in force until 1848, when it was superseded by another statute.[18] New Jersey passed a similar law in 1816, to remain in force five years, but it was repealed three years later.[19] Massachusetts legislated for manufacturing corporations by acts passed in 1809, 1817, and 1821.[20] At first there was a disposition on the part of company promoters to pass by the general statute in order to procure charters by special acts. Of the corporations for manufacturing and industrial objects that received charters from New York State in 1811, nearly one-half were organized by direct action of the legislature.[21]

Between 1800 and 1823 eight States incorporated 557 manufacturing companies with an authorized capitalization of over $72,000,000. Of these companies, 203, with an authorized capital of $20,000,000, were organized in New York, and 161, with an authorized capital of $28,000,000, in Massachusetts. Rhode Island granted no charters of

[14] Massachusetts, *Special Laws* (Boston, 1805), I, 224, 478; II, 64, 193.
[15] New Jersey, *Laws of the State* (ed. Patterson), 102.
[16] Kentucky, *Acts of the Assembly* (Frankfort, 1800), Chap. VII.
[17] *American State Papers, Finance*, IV, 401–403, *cf.* Bentley, *Diary*, IV, 241, Mar. 12, 1814.
[18] New York, *Revised Laws*, I, 245; *Hunt's Merchants' Magazine*, XVIII, 438–442, Apr. 1848.
[19] New Jersey, *Public Laws*, 1816, 21; Field, *Child Labor Policy of New Jersey*, 10.
[20] Massachusetts, *General Laws* (ed. Metcalf), II, 201.
[21] Bishop, *History of American Manufactures*, II, 175.

this character, and Pennsylvania had granted but 10, with a capital hardly exceeding $1,100,000. Over half of these companies were organized, and half of the total capital they represented was authorized, during the four years of the war. Some never began operation, and others had gone out of existence before 1823. The real capital of the concerns still active was considerably less than that authorized in their charters and probably did not exceed $50,000,000.[22] On the other hand relatively more industrial enterprises were conducted by individuals and unincorporated companies than at present.

In discussing the organization of manufactures we shall have occasion again to refer to corporation laws, and to the controversy that arose between 1830 and 1860 regarding their expediency. Before 1860 most of the Northern and Western States had general statutes governing the formation of chartered companies, while the Southern States still granted such privileges sparingly and by special acts. Pennsylvania, contrary to what might have been anticipated, lagged behind its neighbors in this field of legislation. In 1835 the legislature rejected a general law of this character, and up to 1837 it had, by private acts, chartered only 22 manufacturing companies.[23] In 1845 a South Carolina writer, in a pamphlet advocating such charters in his State, cited Pennsylvania as illustrating the disadvantages of an illiberal corporation policy, and mentioned the Gloucester Print Works, a large establishment controlled by Philadelphia capitalists, as having been erected in New Jersey on account of the greater facilities that government afforded for incorporating.[24] In 1847 a commercial publication in Philadelphia predicted that a general corporation law would cause "hundreds of thousands of dollars to be invested in Pennsylvania in various manufactures, and thousands of ingenious mechanics and artisans to find employment in the State."[25] Such a law was not passed until 1849, which was the same year that Missouri provided by general enactment for chartering industrial companies.[26] In 1854 the British commissioners to the New York Exposition commented upon the advantage American manufacturers received from the facility and small cost of incorporating. An instance was mentioned where the incorporation fee of a company capitalized at $600,000 was but 50 cents. Not only the ease with which such privileges were obtained, but also the limited liability of partners, were sufficiently novel to be noted by these visitors. They reported that such laws greatly assisted the introduction of new patents, because people readily

[22] *American State Papers, Finance*, IV, 399–426; *cf.* Bentley, *Diary*, IV, 241, Mar. 12, 1814.
[23] *Niles' Register*, XLIX, 319, Jan. 9, 1836; LIII, 210, Dec. 2, 1837.
[24] *An Inquiry into the Propriety of Granting Charters to Corporations in South Carolina*, by One of the People (Charleston, 1843), in Charleston College Library, Miscellaneous Pamphlets. This subject was discussed with interest in Georgia, and a general corporation law was enacted in that State; *Savannah Georgian*, Nov. 5, 1847; *Columbus Enquirer*, Dec. 28, 1847.
[25] *Philadelphia Commercial List*, quoted in *Hunt's Merchants Magazine*, XVII, 321, Sept. 1847.
[26] Pennsylvania, *Session Laws*, 1849, 563; *Western Journal and Civilian*, II, 353, Sept. 1849.

took chances in speculative enterprises when the amount of money they ventured was thus legally defined.[27] However, State legislatures did not always see this question in the latter light. In 1836 the New York Senate committee on manufactures reported adversely upon a petition of the Poughkeepsie Clock Manufacturing Company to be incorporated, in order to introduce a newly invented metallic clock, on the ground that it was bad policy to grant charters for manufacturing where, as in this case, individual resources might be adequate for successful operation.[28] Three years earlier a glass company had been refused incorporation for similar reasons.[29]

But the general trend of this legislation was in a liberal direction, though at a later period corporations were established more cautiously and perhaps supervised more critically than before 1820. Manufacturers certainly thought that their enterprises were assisted by the facilities for combining capital and limiting liability afforded by this form of organization. To be sure, a comparison between the industrial development of States having liberal enactments and States like Pennsylvania, where the opposition to incorporation was strong enough to check this policy, indicates that forms of organization alone did not determine where manufactures should be located. Such laws were enacted in some States in the hope of attracting industries to places not ready to receive them. But this legislation originated in communities where the coöperative spirit already vitalized social and economic activities, and was perfected in an atmosphere of commercial experience and trained industrial ability. It was a symptom of conditions in themselves favorable to manufactures and created administrative machinery by which their progress was accelerated.

INFLUENCE OF FEDERAL POLICIES AND LEGISLATION UPON AMERICAN MANUFACTURES

Among the many motives that between 1783 and 1787 turned public opinion towards a stronger central government, one of the most important was the hope of effectively protecting domestic industry and commerce. Under the terms of the Constitution which gave Congress power to levy duties, to regulate interstate and foreign commerce, and to grant patents to inventors, the encouragement of manufactures naturally changed from a State to a Federal function. From these powers subsequent interpretation has developed important subsidiary authority to regular industry. As the need for this authority was not felt at the time the Constitution was adopted, it may not have been originally contemplated. In any case, until 1860 the intent and influ-

[27] Whitworth, *Special Report on the New York Industrial Exhibition of 1853*, 9. Mr. Whitworth's colleague dissented in part from this favorable view; Wallis, *Special Report on the New York Industrial Exhibition of 1853*, 4.

[28] New York, *Senate Journal*, 1836, II, *Document* 88, 1–3.

[29] New York, *Assembly Journal*, 1833, III, *Document* 204.

ence of Federal legislation were limited to encouraging industrial production mainly through import tariffs, and were not directed, as they in part have been later, to controlling industrial organization and affecting processes of distribution.

Foreign policies, treaties, and commercial regulations, if we except measures of retaliation against France and Great Britain during the Napoleonic wars, always have been minor influences in our industrial history. Hope of extending our market for provisions and manufactures in Spanish America gave added incentive to our support of the Monroe Doctrine. In 1854 we ratified a reciprocity treaty with Canada, designed to facilitate the sale of factory products to our northern neighbors.[30] But neither these nor other features of our external relations influenced in a measurable degree the progress of national industry, either as a whole or in any of its branches.

When the first Congress under the Constitution assembled, its most urgent duty was to provide revenue for the new government. The colonists had been mainly an agricultural and sea-trading people, whose traditional grievance was the restrictions imposed on their markets and navigation by Great Britain, and their recent struggle for political freedom only strengthened the sentiment thus inherited in favor of free commerce. A new school of thought growing up in England, which was opposed to artificial restraints on trade and industry, contributed a basis of economic doctrine to the empirical opinions of American publicists upon this subject. Consequently the leaders of the young nation were mostly hostile in theory to trade restrictions and to efforts to modify by political action the normal growth of industry. On the other hand, practical considerations, allied not only to the well-being of the people, but even to political independence, compelled attention to the need of encouraging domestic manufactures. These considerations had been emphasized in the minds of the public by the still existing crisis, caused by excessive importations of British goods after the Revolution.

Naturally, therefore, the two questions of revenue and protection, pressing simultaneously for immediate attention, were associated in legislation. In one of the first sessions of Congress Mr. Madison raised the point whether it might not be wise to consider them separately, but he did not press this view and readily acceded to the wish of the majority that they be taken up together. If manufactures were to be encouraged by the National Government, two measures for attaining this object suggested themselves, both founded on precedents already established by the individual colonies and the States that succeeded them. These were bounties and a protective tax on imports. The bounty system, though several times proposed, never was adopted in aid of manufactures. Several States already had local tariffs, under

[30] *Cf.* United States, *Tariff Laws*, 131; *Statutes at Large*, x, Chap. 169.

which industries had been established, and having surrendered the power to levy import duties to the National Government, urged the right of these industries to continued protection by Congress. On the other hand, States could still grant bounties if they so desired. Therefore, it seemed equitable from considerations of Federal policy, as well as expedient from fiscal considerations, to provide such encouragement as was to be given domestic manufactures in connection with the revenue law. From the precedent at this time established Congress never afterwards departed.[31]

Nevertheless, our tariff history has many aspects bearing only remotely on manufactures. With the lapse of time mixed motives, ranging from doctrinaire economic dogmas and abstract constitutional theories to the petty scheming of personal political intrigue, helped to shape this legislation. Compromises between diverse business and local interests nullified attempts to work out a reasoned and consistent tariff policy. Such laws more than others were the sport of partisan politics. Frequent amendments and revisions made their influence impermanent and contradictory. Contemporary evidence regarding them is open to the suspicion of interested bias. Therefore it is not surprising that the relation of our successive tariff acts to industry should be interpreted variously by students. Almost any view of the general effect of these laws may find support in particular instances; and their influence is so combined with other conditions environing the growth of manufactures that the most painstaking attempts to isolate and appraise it as a historical influence are likely to seem arbitrary and artificial.

Under these circumstances an agnostic attitude toward the relation of the tariff to industry might seem excusable; but however difficult to measure with precision, the influence of the protective system upon our manufacturing history has been too important to be neglected. It has manifested itself both directly through the concrete economic conditions which it created, and indirectly through the more elusive and psychological medium of business sentiment. Before attempting to analyze the ramifications of that influence, however, we will describe briefly the successive tariff laws from which it derived its force.

TARIFF LAWS FROM 1789 TO 1816

The first tariff law of the United States went into effect on July 4, 1789, the thirteenth anniversary of the Declaration of Independence. Its three objects were stated in the preamble to be: the support of the government, the discharge of the public debt, and "the encouragement and protection of manufactures." There was no real controversy over the principle of protection, which was accepted generally in the public policy of the eighteeth century. Yet, for the next twenty-five years

[31] *Cf.*, however, sugar drawback, 305, *f.*

at least, our tariff laws were mainly revenue bills, both in the amount of protection afforded and in the attitude of Congress toward them. Aside from continuing and interpretative acts, laws modifying rates of duties were passed almost annually, as the financial needs of the government and growing experience with the amount of income to be derived from different articles directed. Specific taxes upon imported spirits, and upon wines, teas, sugar, molasses, coffee, cocoa, and other articles not produced in the country were a main reliance for revenue. The protective intent of this legislation was indicated chiefly by specific duties upon a small list of manufactured articles already extensively made in America and likely soon to supply the home market. These included boots and shoes, soap and candles, rope and cordage, nails, and wool cards.[32]

Manufactures were also protected incidentally by moderate ad valorem duties applying to articles and commodities not subject to a specific tax. Thus at first gunpowder, earthenware, and glass were liable to a duty of 10 per cent, and hats, paper, iron castings, leather, and leather manufactures, except boots and shoes, were taxed 7.5 per cent. In 1790 the latter rate was extended to cotton and linen manufactures, while India goods, which included calico and many plain cotton fabrics, were subjected to an import tax of 12.5 per cent.[33] Five per cent was levied upon nearly all other imports, except a small enumerated list of raw materials, tools, and personal effects. Until 1795 these duties were based on the valuation in America. After March of that year goods were valued at the place of exportation, but in later laws this practical reduction of the tariff was compensated by higher rates.[34]

The memory of the privations of the late war was still vivid enough to shape in some degree the form of encouragement to domestic producers. It was probably hoped that the specific tax on imported salt, while it afforded considerable revenue, would stimulate the production of that commodity within the country. Regard for local industries determined in some instances the relative tax upon manufactured commodities and the raw materials from which they were made, as in case of leather and saddlery, molasses and rum, malt and beer, raw and refined sugar, hemp and cordage; but this was confined mainly to preventing a positive disadvantage to American manufactures through higher costs of production on account of the tariff. Goods manufactured for export from imported materials receved the benefit of a drawback, the practical importance of which was limited largely to provision-packing, distilling, and sugar-refining.

While these earlier laws were in operation, and before a strong party

[32] United States, *Tariff Laws*, 9–11; *Statutes at Large*, I, Chap. 2.
[33] United States, *Tariff Laws*, 12–13; *Statutes at Large*, I, Chap. 39.
[34] United States, *Tariff Laws*, 36; *Statutes at Large*, I, Chap. 17, § 3.

had arisen to advocate a more decided protective policy, a series of external events having no relation to domestic industry isolated the country commercially and created an organized and salf-conscious industrial interest, which thereafter continued to be the main positive force behind tariff legislation. On December 22, 1807, as a result of the seizure by the British and French, on the high seas or in foreign ports, of nearly 800 American merchantmen, charged with violating the blockade orders which each nation had issued against the other during the Napoleonic wars, the American Governent by an Embargo Act prohibted our shipping from engaging in foreign commerce.[35] This law remained in force until 1809, when it was modified by the Non-intercourse Act of that year, which limited the restrictions upon over-sea trading to England and France. Our commerce did not revive completely between this date and the beginning of hostilities with England in 1812, when war conditions again seriously interrupted our traffic by sea. Therefore, from 1807 until the end of 1814, the United States was isolated, either by its own legislation or by the war with England, from transatlantic manufacturing competitors. Foreign commerce declined, farm produce fell in value, and in general there was an abrupt reversal of the business conditions that had prevailed for nearly two decades previously. The result was a radical displacement of the productive energies of the nation. While agricultural development was by no means entirely halted, and ship-owners and seaport merchants remained intent on a restoration of their former prosperity, which a day's change in the political horizon might accomplish, the price of manufactured goods rose so rapidly in the face of a falling market for other commodities that the promise of high profits, even though they might be temporary and speculative, lured conservative capital into new manufacturing enterprises, while established industries reaped an immediate harvest that gave them the means and the incentive rapidly to extend their scope.

The Embargo and Non-intercourse Acts, coming as they did at a time when American vessels were carrying so large a part of the world's commerce, not only deprived the country of its large revenue from ocean freights, thus reducing the purchasing power of the people, but interrupted almost the sole transport service by which foreign merchandise reached our markets and by which the commodities we exchanged for them were exported. Though the ensuing war with England was attended by many American naval successes, our commerce could not reëstablish itself in the midst of these hostilities, and those British manufactures which previously had commanded our markets were not obtainable at practicable prices even had public sentiment permitted their extensive use. Finally, by the act of July 1, 1812, the previous duties on imported merchandise were doubled, and heavy

[35] Seybert, *Statistical Annals*, 63, 79, 80.

discriminating duties were added on goods brought to the United States in foreign vessels.[36]

During the non-intercourse period preceding the war, ship-building and its allied industries stagnated. The idle dockyards, sail-lofts, and rope-walks threw a large amount of industrial labor out of employment. Some 30,000 seamen were without occupation.[37] Though the expectation of a speedy resumption of commerce under even more favorable conditions than prior to 1807, the imminent hope of which alone made a continuance of the existing foreign policy possible, encouraged these classes of workmen to look for speedy reëmployment in their accustomed trades, their own distress and the attraction of other fields of labor drew many into new occupations; and in general the labor market for manufacturers was easier than it had been previously. With the beginning of hostilities, however, privateering and the naval service caused renewed activity in ship-building and maritime pursuits, while captures from the enemy supplied many cargoes of foreign merchandise to the American market, though seldom at prices low enough to discourage domestic competition.

The disturbance of foreign industry and commerce by the Napoleonic wars, combined with the known opportunity that the stoppage of American foreign trade afforded to establish new industries in the United States, attracted skilled tradesmen from abroad. Some British manufacturers settled in America in express anticipation of approaching hostilities between the two countries.[38] The great distress of the operative population of England during the crisis that found expression in the Luddite riots, a crisis accentuated by the British loss of American markets during the continuance of our non-intercourse policy, promoted emigration to America from the industrial districts of Yorkshire and Lancashire.[39] Pittsburgh seems to have received no unimportant part of its early population of small manufactures from this and similar sources.

These immigrants, both masters and men, had grown up in England under the system of high tariffs then prevailing in that country. They had been educated to believe that such protection was essential to the prosperity and even to the survival of manufactures. They speedily gave popular currency to information regarding the actual scale of duties then in force in Great Britain, compared with which that hitherto levied by the United States seemed absurdly low;[40] moreover the authority they carried as experts in the manufacturing conditions of the foremost industrial nation gave added weight to their advocacy of a protective

[36] United States, *Tariff Laws*, 46; *Statutes at Large*, II, Chap. 112.

[37] This is a common estimate. In 1816 our merchant marine employed about 70,000 men; Secretary of the Treasury to Chairman of Senate Committee on Foreign Relations, Jan. 26, 1816, quoted in Seybert, *Statistical Annals*, 315.

[38] Howells, *Life in Ohio*, 4.

[39] Lingelbach, "Commercial History of the Napoleonic Era," in *American Historical Review*, XIX, 2, Jan. 1914; *Minutes of Evidence, Orders in Council*, 9, in Great Britain, *Parliamentary Papers*, 1812, III.

[40] *Cf.* McLane, *Report on Manufactures*, I, 929–930; II, 217.

policy among the native American employers and artisans with whom they associated.

TARIFF LAWS FROM 1816 TO 1833

When the war ended American manufacturers for eight years had controlled their home markets. They had been able to charge high prices for their products and to earn large profits on their investments. Capital had been diverted to a great extent from shipping and commerce to factory industries.[41] Around these industries had grown up, especially in the Northern States and to a degree even in the West, an industrial interest embracing both employers and employees and including in its remoter alliances producers of raw materials and distributors of manufactured goods. This interest was not yet so well organized or so firmly established as it became ten years later. On the other hand, it did not at first encounter opposing demands from other sections of the country and other classes of society. The dialectics of protection and free trade received slight attention, because there was so little conscious conflict of material interests to invite their use. Consequently, in 1815, when home manufactures were suddenly crippled by excessive importations of foreign merchandise, and the ensuing crises called the attention of the whole country to this and attendant disasters, all parties assumed a strictly practical and opportunist attitude toward legislation to remedy these evils. Manufacturers sought to reëstablish or maintain by law the conditions under which their enterprises had been founded and developed during the previous period of non-intercourse. Nothing less than this, which meant the practical exclusion of foreign goods, would have been entirely satisfactory to them. Public opinion did not support so extreme a measure, but conceded the justice of retaining, at least in part, the protection afforded by the war tariff. Need of additional revenue, to meet the increased national debt, confirmed the expediency of levying higher duties than previously had been imposed in times of peace. The war taxes continued in force until July 1816,[42] when a new law, enacted the preceding April, went into effect. Experience already had shown that existing duties did not prevent excessive importations, but our abnormal foreign purchases were thought due to conditions not likely to be permanent. In 1816 our net imports were almost double those of any previous year in our national history. In view of this, the rates imposed by the new act were not high. But the policy of preceding legislation was reversed by giving equal or greater consideration to protection than to revenue. Cotton and woolen manufactures receive most attention.[43] The war tariff of 27.5 per cent ad valorem upon these

[41] *Minutes in Evidence, Orders in Council*, 449–450, in Great Britain, *Parliamentary Papers*, 1812, III.

[42] An internal-revenue tax upon iron and its manufactures, candles, hats, paper, leather manufactures, and a few other articles, levied by the Act of Jan. 18, 1815, was in force less than a year; *cf. American State Papers, Finance*, III, 210.

[43] United States, *Tariff Laws*, 49–53; *Statutes at Large*, III, Chap. 107.

fabrics was lowered to 25 per cent, with the provision, which never went into effect, that a further reduction to 20 per cent should be made three years later. In fact, however, the two industries were not equally well treated. Imported wool, which previously had been admitted free, though as yet but little used by American mills, was now taxed 15 per cent. Theoretically this reduced the net tariff benefit of manufacturer to less than 20 per cent. On the other hand, coarse cotton goods were protected by what was equivalent to a specific duty of 6.25 cents a yard, through the establishment of a minimum valuation of 25 cents a square yard for this class of fabrics. This provision was intended to exclude East India goods, which, though imported extensively, were unpopular for three reasons: they were made of foreign cotton, and therefore competed not only with northern manufactures but also with southern agriculture; they were cheap in quality as well as price; and they belonged to a class of goods regularly discriminated against in our early tariffs, which levied extra duties on merchandise from east of the Cape of Good Hope, because this was paid for with specie and its importation depleted the country's supply of currency. Duties on hammered iron were reduced, the rate under the new law being less than one-third that which prevailed during the war, but a distinction was made between hammered and rolled bars. Upon the latter a specific tax was now levied rather more than equivalent to the ad valorem duty previously imposed. Most minor manufactures which already had gained foothold in America were affected but little by the new legislation. Rates on leather goods, boots and shoes, and hats remained unchanged. But there was a reduction from 32.5 per cent to 20 per cent in the duty on earthenware, and also some decrease in the duty on window glass.

When the law of 1816 was passed Americans still anticipated the return of commercial conditions similar to those prevailing before the war with England. In this they were disappointed. Our foreign trade did not speedily revive. Thousands of men released from military duty in Europe returned to farming and foreign crops increased; at the same time England levied higher duties on imported grain and provisions.[44] Consequently there ensued a steady decline in the price of American farm produce. In 1819 a collapse of currency inflation caused a financial crisis. These conditions increased popular feeling in favor of protection, but did not cause an immediate change of tariff policy. The act of 1816 was amended for the purpose of raising the duty on Russia sheeting, cast and bar iron, and minor metal manufactures, including small nails and tacks. Also the 25 per cent duty on cotton and woolen manufactures was extended until 1826.[45] Evidently these amendments did not change the general principle of the original law,

[44] Busching, *Die Entwickelung der handelspolitischen Beziehungen zwischen England und seinen Kolonien*, 123.

[45] United States, *Tariff Laws*, 59, 60; *Statutes at Large*, III, Chaps. 98, 103; Stanwood, *Tariff Controversies*, I, 175–176.

which continued without radical modification the rate of duties that had been enforced since the opening of the war with England. Until 1824, therefore, excepting the minimum valuation of cottons, other causes than tariff changes account for variations in the pressure of foreign competition.

Between 1818 and 1824 neither agriculture nor commerce was prosperous enough to create an era of business expansion. Though the country was growing in population and increasing in wealth, this progress was accompanied by considerable economic discomfort. The cotton industry slowly gained ground, except as it was affected by temporary depressions caused by overproduction either at home or abroad. Woolen manufactures were becoming established more widely as subsidiary to household industry, but they made less progress in the field of specialized commercial manufacture. The production of iron was increasing in the West, where it was protected from foreign competition by heavy freights, but throughout the country this branch of manufacture was not making satisfactory progress. New England, in spite of its many small mills and factories and the growing importance of its larger textile operations, was still interested in foreign commerce more than in domestic manufactures, and was hostile to tariff restrictions likely to hamper navigation. In the South sectional opposition to a protective policy was beginning to be manifested. Nevertheless the country as a whole wished higher duties. Especially in the West, the political importance of which was increasing relatively faster than that of other parts of the country, sentiment in favor of encouraging domestic industry had been growing steadily. Those States suffered most from the depression of agriculture and the financial crisis. Protection arguments, advanced by the House committee on Manufactures in 1816, had now become their common property.[46] It was believed that the West must manufacture in order to have a market for its raw materials; that a factory population created a home demand for agricultural produce; and that national well-being required the country to secure for itself the immediate profit from labor-saving machinery.

This doctrine received readier acceptance among northern farmers on account of the rural unrest that accompanied the transition from homespun to factory manufactures. The farm was no longer economically self-sufficing. A habit and necessity had arisen of buying many things that formerly had been produced at home. Consequently it now was necessary to exchange crops for money, and ways to accomplish this acquired new interest. Great Britain and Europe imposed high duties upon our agricultural produce, and thus curtailed our market abroad. Farmers naturally responded by favoring retaliatory duties on European manufactures and the creation of a larger and more

[46] *American State Papers, Finance*, III, 82–83.

diversified domestic market.[47] Moreover, during the days of homespun almost every countryman had been a wool-grower. Specialized woolen manufactures had grown up in alliance with household spinning and weaving, and at this time were conducted for the most part in small mills dispersed throughout the North and West. These mills were associated intimately with the local economy of farming communities and influenced the political sentiment of their representatives.[48] It was not until 1857, when this industry was becoming localized at large establishments in one section of the country, that division of interest between wool-growers and manufacturers manifested itself in tariff discussions.[49] Therefore, wool duties were the central text of the protectionist gospel of northern farmers during their transition from subsistence to commercial farming. But both by analogy and by direct interest the same policy appealed to them in other directions; for at that time many manufactures besides the woolen industry were distributed more widely throughout rural communities than at present.

Opponents of protection assured farmers that factories drew labor away from agriculture and increased wages; but the force of this contention was weakened by the fact that the most prominent of these industries, the textile mills, used women and children operatives, and gave employment to farmers' daughters. Moreover the effect of competing occupations upon the supply of farm labor was counteracted to some extent by immigration and by the improvement of agricultural machinery. Partly for these reasons the growth of factories did not, as it has in some parts of Europe,[50] cause a fall of land values in surrounding districts. To be sure, the industrialization of New England accompanied a decline in its agricultural prosperity, but this was attributed, probably with justice, to the competition of newer and richer lands in the West with the exhausted and poorer lands of the older section, and not to the fact that both labor and capital now found better profits in manufacturing than in farming. In fact, the agricultural competition of the West was used by New Hampshire as a local argument in favor of higher duties on wool and manufactures.[51]

Soon after 1820 an organized industrial interest appeared in Congress. Manufacturers began to present themselves in Washington in connection with tariff legislation when the act of 1816 was under discussion. During the intervening period, though their enterprises by no means had prospered according to their wishes and anticipations, these advocates had become more numerous, better disciplined, and more fully agreed upon a program. Therefore, supported by a widespread public

[47] *Cf.* H. U. Addington to Rt. Hon. George Canning, Great Britain, *Parliamentary Papers* 1828, XIX, 6.

[48] *American State Papers, Finance,* V, 717–720, 760, 847, 864–867.

[49] Stanwood, *Tariff Controversies,* II, 105, 106; *Free Trade in Raw Materials,* by the author of a letter to wool-growers.

[50] *E.g.,* Klein, *Baumwollindustrie in Breuschtal,* 95.

[51] *American State Papers, Finance,* V, 779.

sentiment in their favor, they were able to secure the enactment of a law in 1824 that corresponded, in many respects, with their desires.[52] Nominal duties on cotton manufactures were not changed materially, except that the minimum valuation on cotton cloth was raised to 30 cents a yard. As the cost of manufacturing was much less than eight years previously, and as current prices were correspondingly lower, this minimum now checked the importation of finer goods. Duties upon woolens were raised to 30 per cent ad valorem, with an increase to 33.3 per cent the following year. However, as the duty upon unmanufactured wool was raised to 20 per cent, with a provision that it should be increased 5 per cent annually for two succeeding years, the real protection to manufacturers remained practically unchanged. Their principal contention, that a minimum valuation be established for woolens, as it had been for cotton goods, was refused. Duties on hammered iron bars were raised to 90 cents a hundredweight. A notable feature of this act was the large number of articles made subject to specific duties.

The law of 1824 remained in force four years. In spite of much opposition, which was becoming well organized and consolidated, especially in the South, protection continued to be politically popular. The manufacturing interest was so powerful that its support was courted by Presidential candidates and their partisans. Northern farmers, more than ever convinced that they must have a home market for their wool, were almost as insistent upon encouraging this manufacture as southern cotton-growers were adverse to such a policy. This was a period of free trade and high tariff conventions, whose proceedings abound with allusions to contemporary industrial conditions. Political parties for the moment had almost disappeared, but political factions had grown strong. In the midst of an agitation created by opposing convictions and opposing private interests, the representatives of these factions maneuvered for personal advantages. As a result, the law of 1828 was passed in an atmosphere of political intrigue.

This was the most criticized of all our tariffs. It was stigmatized by its enemies as "the tariff of abominations." Many protectionists opposed it or gave it lukewarm support, claiming that it embodied unpopular provisions purposely inserted to insure its early repeal. Sought primarily for the relief of wool manufacturers, who claimed that the margin of protection afforded them by the preceding law was inadequate, the new act made large increases in the rate of duty upon many other articles.[53] Imported wool ultimately was to be taxed 50 per cent. Woolen goods were protected by an ad valorem tariff of 45 per cent, to be raised to 50 per cent the following year, and a series of minimum valuations was established, similar in principle, but more

[52] United States, *Tariff Laws*, 67; *Statutes at Large*, IV, Chap. 134.
[53] United States, *Tariff Laws*, 73; *Statutes at Large*, IV, Chap. 55.

complicated and less satisfactory in application, than the existing minimum on cotton cloths. The cotton minimum was raised to 35 cents a square yard, which, with the constantly falling cost of this class of manufactures, extended its provisions to much finer fabrics than heretofore. The duty on rolled iron bars was raised to $37 a ton, and the rate on hammered bars to a cent a pound, a tax likely to be felt especially by the farmer. Less radical changes were made in case of other articles; but many of these were of a character likely to be felt and resented by a large body of consumers.

While the law of 1828 was extremely unpopular among classes of people and in parts of the country normally opposed to protection, in operation it did not encounter so much general hostility as was anticipated. New England had swung slowly into the line of tariff supporters. The country was working its way out of the depression that had prevailed with greater or less intensity since the close of the war with England. Both in America and abroad there were evidences of the business revival that was to culminate in another speculative crisis nine years later. Manufacturers were in the main prosperous, and an era of rising prices for agricultural produce kept the farmers contented. This state of sentiment was encouraged further by the fact that, contrary to predictions, foreign commerce did not decline and the price of manufactured goods actually fell instead of rose.[54] Two features of the act that were generally unpopular—the high duties on salt and molasses—were modified in 1830, and at the same time the tariff on tea, coffee, and cocoa was lowered.[55]

TARIFF LAWS FROM 1833 TO 1860

Nevertheless the country continued uneasy under the existing system, and in 1832 political exigencies, if not popular demand, caused a further revision to be undertaken. Party spirit had grown stronger. Slavery was increasing the conscious diversity of interest between the South and the rest of the nation, though it was not yet recognized openly as the cause of that division. The high duties of 1828 had not decreased imports and the growing revenue was hastening the extinction of the public debt. This fiscal reason added great weight to the partisan and sectional demand for reopening the tariff question. The nation now had to choose between lowering the tariff or finding some use for the surplus revenue. Protectionists wished to spend the latter for internal improvements; or, if tariff reductions must be made, to confine these to duties upon articles not coming into competition with American manufactures. Henry Clay introduced in the Senate a resolution in favor of the latter policy. Out of the discussion precipitated by these conditions emerged a law intended to lower duties, but not

[54] *Senate Doc.* 104, 22d Cong., 1st sess.
[55] United States, *Tariff Laws*, 79; *Statutes at Large*, IV, Chaps. 185, 189.

changing rates radically except in case of wool and woolens.[56] The latter were subjected to important reductions, and in respect to them minimum valuations were abolished. Tea and the kind of coffee chiefly consumed in the United States were placed on the free list. Thus upon the whole the protectionist program was carried through, though with some compromises objectionable to its supporters.

Naturally these modifications were not acceptable to free-traders. South Carolina attempted to nullify the law by State action. Though that movement failed in its direct purpose, and the law was enforced by the Federal Government, this attempted resistance turned public opinion throughout the country in favor of conciliatory measures and of a reconsideration of the whole tariff question. This disposition received support from popular distrust of the growing influence of capital in both politics and business. It was natural that this influence should increase under the changing conditions of production then occurring, and equally natural that its appearance should alarm the democratic instincts of the people. In 1832 a New Hampshire senator sang the swan song of homespun industry in his State. The good old times when every family raised, spun, and wove the materials for its own clothing had passed away; the village clothier and his fulling mill had disappeared; large factories, supported by overgrown an unscrupulously managed capital, had annihilated the household industry. Now "the farmers' daughters are obliged to herd together in fifties, hundreds, and thousands, in the manufacturing establishments; or if they remain at home, no longer find that profitable and wholesome employment which was so highly beneficial to the prosperity and to the morals of the whole community."[57] Opponents of protection accused the high tariff of causing the decline also of small manufactures. To quote a southern senator, this system enabled great plants with immense capital to prostrate "small establishments which might secretly and silently work their way into an honorable and comfortable existence," and under its sway, "one great establishment rises on the ruins of all the surrounding inferior ones."[58] Contemporary agitation against the United States Bank carried with it a sympathetic attack upon corporations in general. The North Carolina legislature had resolved that the tariff bill of 1828 was "artfully designed for the advancement of the incorporated companies of New England."[59] A tumultuous meeting of mechanics in Philadelphia memorialized the legislature against granting a charter of incorporation to the Vulcan Iron Works, in the following terms:

[56] United States, *Tariff Laws*, 82; *Statutes at Large*, IV, Chap. 227.

[57] Hill, Isaac [New Hampshire], speech in U. S. Senate, on the Clay Tariff Resolutions, 1832, 3.

[58] Rankin, Christopher, [Mississippi], speech in U. S. House of Representatives, Apr. 1 and 2, 1824.

[59] *American State Papers, Finance*, V, 716.

"The grant of particular privileges to any body of men for the purpose of carrying on business beyond the reach of individual enterprise, operates most unjustly upon those individuals, who upon their own responsibility and without legislative aid are engaged in the same pursuits. In the opinion of this meeting, the grant of the charter prayed for would not in any degree subserve the interests of the community, whilst it would enrich the individuals who without any risk of private fortunes, would thereby be enabled to overwhelm those who have spent their lives in the perfecting of the different branches of the arts, and who have hazarded their all in the business proposed to be conducted by the above company."[60]

About the same time the legislature of Alabama formally declared:

"The sponge of monopoly has absorbed nearly the whole wealth of the nation. * * * Of 21,000,000 people, less than 300,000 are said to own the whole of the immense public debt, and nearly the whole of the landed property."[61]

Therefore one cause for the political decline of protection between 1833 and 1860 is to be found in the reorganization of industry. The centralization of manufactures in large plants and within limited areas terminated the intimacy that existed between the early manufacturing movement and the common people. Large corporations were no more urgent for protection than smaller enterprises. But they represented to the public a new, strange, and unwelcome power in the business world, and long before modern trusts were known they were regarded as the embodiment of monopoly, with all its attendant evils.

However, this sentiment was subordinate to political expediency in determining the form of the compromise act of 1833.[62] Henry Clay, who was a leader of the protectionists, introduced this measure and was largely responsible for its adoption. The law provided for a gradual reduction of duties until none exceeded 20 per cent ad valorem. This was accomplished by removing one-tenth of the existing duty in excess of that amount every two years until 1841. The remaining four-tenths was then removed by two installments, in close succession, so that after June 30, 1842, 20 per cent was the maximum duty imposed on imports. This was assessed, however, on their value at the port of entry and was payable in cash. Except for clauses of comparatively minor importance, reducing immediately certain woolen duties and providing for an eventual extension of the free list, the relative rates on different articles established by the tariff of 1832 were not directly modified.

With the passage of the act of 1833, agitation upon the subject of the tariff for a time ceased. The law was regarded in a certain sense as a treaty of peace between opposing sections and interests, which moral obligations made it incumbent upon all parties honorably to observe.

[60] *Report of a meeting held at Harmony Hall, Philadelphia,* March 27, 1826, in *Carey Clippings' Manufactures,* VIII.

[61] *American State Papers, Finance,* V, 849.

[62] United States, *Tariff Laws,* 95; *Statutes at Large,* IV, Chap. 55.

During the early years of its enforcement the country was unusually prosperous, but in 1837 occurred the most serious financial crisis in our history. This disturbance had its source in conditions extending to other countries and was caused immediately by overspeculation, accompanying a reckless system of public finance. Recovery was very slow, and the ensuing depression was marked by a series of subsequent crises which repeatedly unsteadied the confidence of the country. Public credit sank to the lowest point since the Constitution was adopted. Revenues fell until they paid hardly more than half the necessary expenses of the government, and some of the older and wealthier States defaulted on their debts. Consequently in 1842, when the period of gradual reduction in duties established by the compromise of 1833 terminated, a higher tariff was found necessary in order to restore the credit of the government. The new law enumerated in detail long lists of articles made subject to specific taxes, thus preparing the way for the schedules introduced four years later.[63] Woolen manufactures were protected by an ad valorem duty of 40 per cent and cotton goods by 30 per cent. For the latter only was a minimum valuation provided. The principle of assessing imports on their cost at the port of entry, which had been reëstablished by executive order during the last months of the compromise law, was not continued; but hereafter duties must be paid in cash. In general the act afforded much more protection than manufactures had enjoyed during the years immediately preceding its passage.

Coincident with the new tariff began a revival of business from the depression that followed the panic of 1837. Both manufactures and commerce benefited by this condition. But four years later a series of political accidents brought into power a party controlled largely by southern interests hostile to protection. This resulted in the passage of the Walker bill, of 1846, and the beginning of a revenue-tariff era continuing until the Civil War.[64] The new law classified imports into eight schedules, designated by the first letters of the alphabet, and subjected all to ad valorem duties ranging from 5 to 100 per cent. Schedules C and D, covering articles taxed 30 and 25 per cent respectively, included manufactures of cotton, woolen, and iron, and other articles around which tariff controversies had chiefly centered. Unmanufactured wool also was subject to a 30 per cent duty. The new law remained in operation without essential modification for eleven years, or longer than any preceding act in our history. In 1857 a further revision was undertaken, with the fiscal object of reducing the redundant revenue and with the industrial object of lowering rates on raw materials.[65] The principle of levying only ad valorem duties was re-

[63] United States, *Tariff Laws*, 102; *Statutes at Large*, v, Chap. 270.
[64] United States, *Tariff Laws*, 121; *Statutes at Large*, ix, Chap. 74.
[65] United States, *Tariff Laws*, 133; *Statutes at Large*, xi, Chap. 98.

tained, but classifications were revised and general reductions put into force. This was the last tariff enacted before the eve of the Civil War, an event that inaugurated a new era in our industrial history and in the legislation which helped to make it.

To summarize what has been said regarding the tariff, the seventy years ending in 1860 may be divided into three periods. The first, characterized by gradually increasing revenue duties only moderately protective and with but secondary protective intent, ended in 1824. During these years there was comparatively little sectional or partisan clash of interests over tariff policies. From 1824 to 1832 followed an era of high protection, accompanied by bitter agitation. This was terminated by the compromise of 1833, which ushered in a time of better feeling, though the comparative harmony of the early days of the Republic never was restored. Except for the brief and not unqualified Whig supremacy of 1842, the government was in the hands of men friendly to planting rather than manufacturing interests. Other questions, especially slavery, were absorbing an increasing share of public attention. Therefore the tariff was to some extent left to take care of itself and remained on a low protective basis, with the object of revenue primarily in view.

GENERAL INFLUENCE OF A PROTECTIVE POLICY ON MANUFACTURES

Generalizations as to the influence of the tariff on manufactures prior to 1860 are more difficult to substantiate in the United States than in most other countries. Our legislation was not permanent, and its controlling features were determined amidst the uncertain and unsettling conditions of popular political campaigns. Even where policies had sufficient finality to exert a constant influence for a measurable period, as in case of cotton manufactures, powerful competing influences, peculiar to a rapidly growing country in the early stages of development, cloud this effect to the observer. Only a few broad conclusions may be drawn—and those with diffidence—from testimony contemporary to the successive tariff laws. Such testimony is most fruitful of conviction when connected with an analysis of the results which a greater or less degree of protection is supposed, under ordinary conditions, to accomplish.

Assuming high duties to stimulate manufactures, the prosperity of a country in the early stages of industrial progress, where factory employment and production play little part in the general welfare of the people, will be less dependent on tariff laws than will that of a country already absorbed but not yet supreme in this field of enterprise. Such was the condition of the United States prior to 1812. Our first tariff laws, which we have seen were not without protective intent, though they subordinated this entirely to revenue considerations, did not influence greatly general business prosperity. The effect they exerted

was upon industry as a whole rather than upon its individual branches. As a bar to competition they were strong mainly where competition was least needed, and they affected but slightly the industries then incubating that were destined later to become representative of our larger manufacturing activities. Yet indirectly, as establishing precedents for subsequent protective laws and creating a sentiment for their support, these earlier acts can not be disregarded. Even before the war with England, when the peace of Amiens gave a temporary setback to our foreign trade, Congress was inclined to adopt protective policies of a more definite character.[66] Meanwhile the regular, though moderate, exercise of this function, as a recognized power of the Federal Government, gave confidence to those embarking in industrial undertakings. Numerous petitions from manufacturers asking for legislative favors indicate a prevailing belief in the ability and disposition of the government to foster such enterprises. Though the tariff remained nominally low, its effect was reënforced by the greater cost of importing at that time, estimated by Hamilton at 15 to 30 per cent,[66] and by the high price of British goods during the war in Europe. We are told by a contemporary that, "in the main, if manufactures did not greatly or decidedly improve, they at least maintained their standing."[67] Their ability to hold their own may or may not have been due to the moderate tariff then in force; but, be that as it may, the law stood in the popular mind as the symbol of a power and a policy adequate to insure their prosperity.

After non-intercourse and war had forced our manufactures, as in a hotbed, to precocious growth, the effect of the tariff upon these industries became both more important and more easily defined. This effect, according to the testimony of manufacturers themselves, was neither entirely good nor entirely bad. To be sure there were opinions, almost as numerous as the industries and the individuals affected by this legislation, as to what might constitute a wholly desirable and unobjectionable tariff law, but such a law never became a historical fact and therefore does not fall within the bounds of this discussion; neither do our inquiries lead us beyond the manufacturing industries into the remoter question of the influence of protective duties upon other lines of production or upon the welfare of the general public, except as these again can be shown to react directly upon manufacturing development.

Manufactures were prostrated so completely by the excessive importations of 1815 and 1816 that the tariff of the latter year, which lowered rather than raised existing duties, was a subordinate influence in the general business situation. If we except the cotton industry, it

[66] *American State Papers, Finance*, I, 730, Report of the House Committee on Manufactures, Feb. 10, 1802; I, 130.

[67] Joshua Gilpin, in McLane, *Report on Manufactures*, II, 876; *cf.* also Samuel Slater, *id.*, I, 929.

would be difficult to connect this law as a general cause with the manufacturing development that followed the crisis of 1819. The protection movement of the ensuing decade was perhaps as much an expression as a cause of the phase of our industrial growth that it accompanied; but the three laws that resulted from that movement gave added confidence to investors and assisted and hastened the diversion of our national energy into new productive channels. Yet the political agitation that this legislation occasioned created business uncertainty and made this period one of speculative rather than conservative industrial progress. Consequently the compromise act of 1833, though duties were lower in effect and still lower in contemplation, brought the welcome feature of a settled tariff policy. Manufactures swung ahead on the rising tide of currency and commercial expansion, only to be thrown into the breakers of the subsequent collapse and panic. Candid historians no longer connect the world-wide crisis of 1837 with our tariff laws; but the recovery of our manufactures during the five disastrous years that followed was made more difficult by the moral and economic discouragement of ever-lowering duties. The revival of general business prosperity about the time the protective tariff of 1842 was enacted was probably an assisted coincidence. That law was a tonic in a period of commercial convalescence, the psychological effect of which may have been as important as its directly economic consequences. It soon was followed by the revision of 1846, which produced no immediate change in the industrial activity of the country. War with Mexico, the discovery of gold in California, a big immigration from Germany following 1848, and the era of railway-building, all were new and important conditions affecting our national prosperity during its decade of influence. The crisis of 1857 already lowered on the horizon when the tariff of that year was under discussion, and the existence of that act was too brief, under the perturbed conditions of the time, to leave much impress upon the history of our manufactures.

Before leaving this rather negative discussion of the influence of the tariff upon manufactures as a whole, more particularly as manifested through general business conditions, and undertaking to trace its specific effects upon individual industries, certain matters of broader application remain to be considered. America was a debtor nation when the Federal Government was organized and remained so throughout the period we are describing. Like most new countries, demanding capital for development, its balance of trade usually was unfavorable. Until the middle of the century we mined no gold and silver, and our currency was based upon imported specie. Had periods of liquidation with Europe depleted our supply of the precious metals, colonial experience suggests that manufactures, together with other forms of business, would have suffered. In all these respects there had been no essential change from conditions a century

before, except that now our secondary manufactures were specialized instead of conducted in the household. But this difference was a most important one. Lack of money by curtailing exchanges promoted homespun industries, but paralyzed factory enterprises. So far, therefore, as a low tariff might have influenced money conditions, by encouraging importations, and thus impairing the specie basis of our currency, it would have lessened general industrial activity. But the statistics show no such effect. From 1821, when official records of bullion and specie imports and exports begin, until 1860, the increase or decrease of precious metals from these causes was as follows:[68]

Per capita annual gain or loss of gold or silver by importation and exportation during tariff periods (1816–1860.)

Tariff law	Per capita increase or decrease of precious metals annually.	Tariff law.	Per capita increase or decrease of precious metals annually.
1816	$0.24 decrease	1838*	$0.36 increase
1824	.02 increase	1840*	.03 "
1828	.13 "	1842	.12 "
1832	.31 "	1846	.93 decrease†
1833*	.76 "	1857	1.62 " †
1836*	.44 "		

*Tariff reduction under compromise law.
† The true per capita supply was increasing from an excess of domestic gold.

Evidently the tariff was quite subordinate to other influences in determining the flow of gold and silver to and from the country. The high tariffs of 1824 and 1828 coincided with a slow accumulation of these metals. During the hard times between 1836 and 1840 the supply grew faster than under the protective tariff of 1842. Our large merchandise purchases abroad after the discovery of gold in California were rendered possible, and probably in no small part caused, by this suddenly increased means for paying for them. The government coined between three and four times as much money between 1850 and 1860 as during the preceding sixty years since its organization.[69]

Neither the general price-level nor prices of particular manufactures varied in definite relation to tariff changes. Other influences controlled these movements, of which probably the most important was the continuously lowering cost of production due to improvements in processes and machinery. While increased domestic competition helped to prevent higher duties from raising prices above their previous average, this cause does not account for the general decline of prices in several particular instances. The tariff was probably one cause of the prevailing higher cost of manufactures in America as compared with Great

[68] Computed from *Finance Report*, 1861, 221, Table 15.
[69] *Finance Report*, 1861, 219, Table 14.

Britain, but it was by no means the sole cause. This difference in cost had existed in colonial times, when America was allowed to levy no duties on the manufactures of the mother country, and it continued throughout the low-tariff era before the War of 1812, when freight and exchange—at least for certain periods—were as favorable to cheap importation as during any part of the following half-century.

When British exporters flooded our markets with merchandise immediately after the peace of 1815, the first result was to lower the price of manufactures only, as these imports did not compete with other products of American industry. Four or five years ensued before the depression affected in like degree the price of agricultural produce, the value of investments except in factories and mills, and the wages of labor. When the first protective laws were passed the country was in the midst of a general downward price movement.[70] But we can not infer that they checked the movement, because when a recovery occurred it was common to England as well as America. A marked decline in prices occurred soon after the act of 1828 went into force, though that law imposed the highest duties levied prior to 1860. As its passage was a surprise to both merchants and manufacturers, importers had not increased their foreign orders nor had factories been extended in anticipation of its enactment. Yet so serious was the accompanying fall of prices that merchants appealed to Congress to remit the higher duties they had to pay on goods under command or in transit to America when it went into effect. During the first year of its operation negro cloths fell 10 per cent, cotton bagging and shoes were cheaper than previously, and not a single article of British merchandise advanced. Even coarse wool and hemp, raw materials heavily taxed by this tariff, took part in this decline. Again American conditions but reflected the course of an international price movement.[71] While the comparatively low ad valorem tariff of 1846 was in operation, a sudden increase of gold and silver production gave tone to the market, not only in the United States but throughout the world.[72] In a word, the price-level of manufactures can not be shown to have responded measurably to tariff changes, though such changes, like a stone thrown into a pond, may have produced local and temporary undulations upon its surface.

DUTIES ON RAW MATERIALS

Most raw materials always have been abundant and accessible in America. The exceptions to which our tariff legislation has applied are those that require considerable labor and care in their preparation. The protection of these has been supported by the same arguments as the protection of manufactures. From the beginning of our tariff

[70] Hayward, *Prices of Forty Articles for Forty Years.*
[71] *Sen. Doc,* 104, 22d Cong., 1st sess.
[72] *Hunt's Merchants' Magazine,* XXXVII, 213, Aug. 1857.

legislation the policy was to admit free or at low duties raw materials used in industry, and not infrequently to allow a drawback of any duty that might have been paid when these materials were reëxported in finished form. The only tariff framed to some extent on the theory of not thus discriminating between raw materials and manufactures was the law of 1846, and even that act did not consistently apply this principle. To be sure, in 1828, hostility to a manufacturing section of the country rather than to manufactures caused to be inserted in the act of that year some taxes on raw materials unfavorable to certain industries. But Secretary Walker, whose influence dominated the law of 1846, based his opposition to the practice previously prevailing on grounds of theory and general policy. In the report which brought before the country the act which bears his name, he criticized the preceding tariff because "it discriminated in favor of manufactures, and against agriculture, by imposing many higher duties upon the manufactured fabric than upon the agricultural products out of which it is made."[73] In his first annual message President Fillmore noted as unfortunate the provisions of this law that imposed "a higher duty upon raw materials that enter into our manufactures than upon the manufactured articles."[74] When, largely with the purpose of removing the tax on such materials, this tariff was revised, extreme opponents of protection attacked that object expressly on the ground that it would favor manufacturing.[75] Nevertheless, these exceptions of legislation and sentiment were temporary, at least as an important or controlling force in tariff policy, and they did not manifest themselves until many of our industries were well established.

However disposed our early lawmakers may have been to discuss political generalities, they shaped their economic legislation with regard to practical rather than theoretical considerations; consequently they were not troubled by the scruples that affected a later generation in determining tariff policies. The law of 1789 admitted free of duty furs for hatters, wool and dyeing materials for cloth-makers, hides and skins for tanners, lead, pewter, brass, sheet copper, and wire for metal-workers, and saltpeter for manufacturers of gunpowder. Three years later pig-copper, wool, and sulphur were added to these articles.[76] In 1804 paper-makers secured free rags and brush-makers free bristles, while unworked clay and certain drugs were admitted without duty.[77]

In regard to textile fibers a different policy prevailed. A duty was imposed on cotton between 1790 and 1846, but it had more political than economic moment. Hemp was protected under the early laws,

[73] *Reports of the Secretary of the Treasury*, v, 8–9.
[74] *Sen. Doc.* 72, 62d Cong., 1st sess., Part III, 2462.
[75] Stanwood, *Tariff Controversies*, II, 99–100.
[76] United States, *Tariff Laws*, 30; *Statutes at Large*, I, Chap. 27, § 2; *cf.* p. 290, Note 1, *f*. A duty was laid on lead the next year; United States, *Tariff Laws*, 12; *Statutes at Large*, I, Chap. 39, § 1.
[77] United States, *Tariff Laws*, 41; *Statutes at Large*, II, Chap. 57, § 1.

in spite of the fact that this tax was a burden upon ship-building and navigation, because a domestic supply was considered necessary in time of war. After Kentucky began to exercise influence in legislation, the duty was retained in order to support protection sentiment in that State. Flax at this period continued to be raised by farmers for household use, and its almost complete displacement by cotton was not anticipated. Consequently there was still hope of founding upon the domestic crop a commercial manufacture of linen. But American hemp and flax were dew-retted, and not so well suited for a better grade of manufactures as the more laboriously prepared and water-retted fibers of Europe. Kentucky hemp was made into bagging, bale covering, and the cheaper kinds of cordage used on farms, plantations, and river boats, but manufacturers of ship's cables and cordage, and of linen sailcloth and thread, were obliged to import their raw materials in spite of the tariff; and the growth of their enterprises was checked and the cost of their products was increased by these duties. The rate on hemp was made $20 a ton in 1792, doubled during the War of 1812, and raised to $60 a ton in 1828.[78] Four years later it was lowered again to $40, and after the gradual reduction of the compromise law was reëstablished at the same rate. The Walker tariff levied a tax of 30 per cent on raw hemp and of only 25 per cent on cordage, which was the principal article for which it was used in America.

Flax duties received less attention. Until the War of 1812 the rate was 5 per cent; but it was raised by subsequent tariffs to $55 a ton, a provision that occasioned much protest from the few manufacturers employing it.[79] Under the law of 1832 it was admitted free. In 1842 the duty was made $20 a ton, but four years later was lowered to 15 per cent. By the latter tariff manufactures of flax were taxed 20 per cent, so that if we allow for waste in manufacturing, the duty was about equal upon the material itself, whether imported raw or in the form of yarn and cloth.

Silk was included among the unenumerated commodities subject to a low ad valorem duty until 1841, when the rate was increased to 20 per cent. The law of 1842 imposed a specific duty of 50 cents a pound on raw silk and $2.50 a pound on its manufactures. This was followed by a reduction to 15 per cent ad valorem under the Walker tariff, and by its admission free after 1857. Several petitions were presented to Congress from time to time by people who thought that with sufficient protection silk might be produced profitably within the country, but the article was regarded as a luxury and experience dating back to the days of the colonies suggested that the hope of raising it in America was illusory. A few manufactures of sewing-silk and small goods were begun, but did not become well established until after 1860, and duties

[78] Report on Tariff Legislation, in *House Ex. Doc.* 109, 42d Cong., 2d sess., Appendix A.
[79] *American State Papers, Finance,* v, 1038, 1039.

on the raw materials they used were unimportant in a larger view of contemporary industry.

Duties on wool invoked more controversy and had more obvious influence upon the prosperity of manufactures than those affecting any other article used in industry, with the possible exception of iron. Not only did wool-growers, as already mentioned, exercise great political influence and therefore bring their wants prominently before the public, but they encountered more class and sectional opposition than other producers of raw material. Commercial sheep-raising was about as definitely localized as cotton-planting. Under such conditions other than purely economic influences shaped the opinions and arguments involved in contemporary discussions of wool duties. Notwithstanding this, and perhaps because of the larger amount of data, even though insufficient, that the controversy over that question brought together, the relation of the wool tariff to manufactures is pictured more adequately in contemporary testimony than similar relations in other industries. Moreover, the manufacture itself was the most important of those depending on imported materials for their prosperity.

Until 1816 wool was admitted free,[80] and the moderate ad valorem duty of 15 per cent imposed the latter year was of negligible effect on manufacturing. Such factories as were established before 1820 used domestic wool mainly, having departed but little from the customs and processes of household industry. Free wool hitherto had not encouraged their expansion, nor did the duty just mentioned check their development. At this time we probably exported more wool than we imported. In fact, until 1821 our foreign purchases did not exceed 10,000 pounds a year.[81] But during the following decade, when all manufactures were becoming better established, importations increased so rapidly that between 1825 and 1828, in spite of the heavier tax then imposed, they annually averaged over 2,600,000 pounds.[82]

It was this change in the direction of raw wool passing through our ports that caused the first real demand for a duty on that product. Manufacturers did not oppose this tax, provided the duty on woolen goods was made high enough to assure them a satisfactory margin of protection, after allowing for the higher cost of their materials. But the adjustment of rates upon crude commodities and their finished products always has been one of the most complex problems of tariff-making, and as applied to wool its complications reached a maximum. In the first place, the question was viewed and debated in Congress as much on its political as on its economic merits. In the second, few

[80] The addition of unmanufactured wool to the free list in 1792 (United States, *Tariff Laws*, 30; *Statutes at Large*, I, 27, § 2) seems to have been unnecessary; *cf.* United States, *Tariff Laws*, 11, 13; *Statutes at Large*, I, Chap. 2, § 1, end; Chap. 39, § 1, end.

[81] *American State Papers, Commerce and Navigation*, II, 612.

[82] Wright, *Wool Growing and the Tariff*, 340, Table IV.

reliable data existed, and still fewer were presented and understood by those who controlled the destinies of this legislation, relating to those technical elements of manufacturing that determined the influence of these duties upon industry.

In 1824 and 1828 commercial woolen manufactures were but recently established and were absorbed in a process of mechanical and commercial transition. Wool-growing, likewise, was in a plastic phase of development, new breeds and changing localization having modified radically within a generation the character of American fiber. The economic limits to the diversification of this industry were not yet ascertained, and therefore neither growers nor manufacturers were aware just what influence protection might have on the local production of raw materials. Remoter aspects of competition, due to changing fashions and to the displacement of staple fabrics by those of different texture or materials on account of price changes, were not foreseen, nor was it appreciated that the competition of finished goods was in its ultimate results as much a competition between raw materials as between manufactures. Therefore the wool and woolens tariff was designed to respond to conditions assumed to be much simpler than they really were, and to attain results not likely to be realized even through the best devised legislative measures.

Fundamentally, the manufacturer of wool faced the same problem as the manufacturer of hemp and flax. While the country supplied materials suitable for some of the goods he made, it did not furnish the complete assortment required for a developed industry. American wools were excellent for making homespuns and medium-grade carded fabrics. The United States produced scarcely any combing wools, little wool of the highest grade required for fine cloths, and almost no coarse wool suitable for those manufactures that our early factories, for technical and market reasons, were best qualified to produce. A certain school of protectionists thought that a high duty would cause all grades of wool to be produced in America in the greatest diversity and abundance. Farmers feared that importers would take advantage of tariff discriminations in favor of qualities of wool not raised in the country, to bring in wool really competing with that already produced at home. Skillful sorting and grading, especially of unwashed fleeces, might work wonders with inferior appearing wool after it had passed the customs barriers. Consequently strong influences were brought to bear on Congress against making concessions to manufacturers using foreign wool, no matter how clearly they showed the necessity of such concessions, under existing conditions, for the prosperity of their industry.

On the other hand, the opponents of protection attacked duties upon woolens rather than those upon wool. Southern planters were interested in getting their negro cloth cheap, whatever its source, and

were not interested in promoting the growth of coarse woolen manufactures in America. In the North the importing interest made its profits on cloth rather than on the materials from which it was produced. Consumers bought clothing, and did not buy wool directly. Therefore the manufacturer was placed between two interests, one attacking his margin of protection from below and the other from above. His only recourse against the former was the conviction of growers that their prosperity depended entirely upon the existence of local factories to buy their product and that in some way such factories must be enabled to survive. His safety against the latter was by alliance with other manufacturing interests, whose influence combined with his own might control legislation. However, at the best he fared but moderately well, as consideration of the successive laws affecting his industry makes evident.

In 1824 the first attempt was made to discriminate in duties between coarse wool on the one hand and medium and fine wools on the other, by retaining the earlier rate of 15 per cent on wool costing 10 cents a pound or less at the place whence imported, while other grades were subject to a tax ultimately rising to 30 per cent. The law of 1828 reversed this policy by taxing coarse wool more heavily than finer grades. This was accomplished by imposing a specific tax of 4 cents a pound irrespective of quality, to which was added an ad valorem tax rising to 50 per cent. On wool worth 8 cents a pound this amounted to 100 per cent duty, and on wool costing 40 cents a pound to a duty of only 60 per cent. Four years later another reversal of policy occurred, and wool costing not more than 8 cents a pound was admitted free, while other grades remained subject to the former specific tax of 4 cents plus 40 per cent ad valorem. The compromise act therefore modified this section of the tariff only as it affected medium and fine wools, and in such a way that duties on medium wools were lowered somewhat more rapidly than those on finer grades. In 1842 the law was changed so as to limit wool admitted free to that costing 7 cents a pound or less, and to tax other grades 3 cents a pound plus 30 per cent ad valorem. In 1846, as we have seen, a uniform rate of 30 per cent was established for all grades of wool and for its manufactures. In 1857 a temporary return to an earlier policy admitted wool costing 20 cents a pound or less free, and imposed a tax of 24 per cent ad valorem on more expensive grades.

The effect of these successive duties on the woolen industry was conditioned by the proportion they bore to those on finished goods and by their actual or anticipated permanence. Roughly the cost of the wool in a yard of cloth was one-half the total cost of the finished cloth to the manufacturer.[83] After Great Britain abolished her heavy wool duties, in 1824, it was estimated that the factory-own-

[82] *American State Papers, Finance*, v, 781.

ers of that country paid about two-thirds as much for their raw materials as did those of America.[84] Such a generalization, of course, was not accurately true; it could not apply equally to all grades of wool and woolen manufactures at the same time, if we are to assume that the American tariff had any real effect on the price of imported wool; nor was it an equal approximation to truth under successive tariff laws. At the same time our manufacturers believed that except for the higher cost of raw materials they could make cloth as cheaply as their English rivals.[85] Behind these estimates, which appear in the evidence recorded by congressional committees and gathered by treasury investigators, it is impossible to go. Statements of contemporary manufacturers, some of whom had followed previously the same business in England, carry more weight than other data now available, though a close study of such testimony reveals a wide margin of fallibility. Therefore, inferences based upon it are in the nature of guesses, supported by probabilities, but with little claim to precise accuracy.

Assuming the relative cost of materials and of manufacturing in England and the United States to have been as stated, the proportion that the price of wool bore to the price of cloth was less in the former than in the latter country, and British manufacturers were less affected than those of America by duties on raw wool. Theoretically competition between the two countries would have been more than equalized by a duty on woolens equivalent to one-third the cost of the raw material used in making them, plus half the rate of any additional duty thereafter imposed upon the wool itself. But American manufacturers by no means felt secure under such a theoretical equilization of conditions, and they sought and obtained a positive margin of protection far above that limit. Neither in case of the woolen or of any other industry, did Congress intentionally discriminate against manufacturing through the respective duties laid upon raw materials and finished products. Consequently the effect of the tariff was always a positive quantity, though in respect to the woolen industry this quantity was a binomial with a negative member.

Under the law of 1816 the duty upon the wool in a yard of cloht was about 6 per cent of the foreign value of the cloth, while the duty on the cloth was 25 per cent of the foreign price, leaving 19 per cent of the price as protection to the manufacturer. This ratio was not materially changed by the tariff of 1824. The minimum valuations upon woolen goods established by the act of 1828 make it impossible to determine the ratio the duty bore to their true value. But this rate was theoretically the same for all grades of fabrics, while the duty on the raw materials from which they were made was higher for coarse than

[84] *American State Papers, Finance*, v, 796, 800, 805.
[85] *American State Papers, Finance*, v, 820, 822, 825, 827, 829, 831.

for fine goods. However, the cost of wool was a smaller fraction in the total cost of cheap than of expensive fabrics, while the minimum duty of 22.5 cents a yard imposed by this tariff amounted to nearly 100 per cent of the factory price of negro cloths. This gave northern manufacturers additional control of the plantation trade, but encouraged the use of cotton and tow yarns and mixtures in the goods they sold to southern consumers. After the temporary fall of prices that happened to strike America shortly after this tariff was enacted, negro cloth rose from 30 cents to 45 cents a yard. This increase was attributed to the duty on coarse wool, and was one of the grievances arousing violent opposition to protection in the South.[86]

That the tariff was not the sole cause of these changes is indicated by wide and contradictory fluctuations in prices during the time it was in force. On the whole the act of 1828 seems to have interfered with conditions surrounding the woolen industry without materially assisting it. Under the law that followed, which gave some of the best established branches of manufacture free raw materials and provided a margin of protection amounting to 25 per cent on fine fabrics, prosperity, which had revived about 1830, continued for a time to increase. After 1840 the country no longer depended on outside sources for such fine wool as our factories then consumed, and we were beginning to export a moderate amount of that commodity.[87] Coarse wools were admitted by the law of 1842 at a nominal duty of 5 per cent. Probably the relatively high tariff on woolen goods imposed by that act, in connection with the low price of raw materials, hastened the revival of the industry from the depression following the panic of 1837. During its continuance some American woolens found a market even in Canada, in competition with those from Europe.[88] Therefore when the law of 1846 went into force factory-owners again were prosperous, and for nearly twenty years had ceased to be concerned seriously about wool duties.

However, the Walker tariff, by taxing coarse wool, which had become a necessary dependence of manufacturers, as heavily as the goods produced from it, changed existing conditions so radically that, had the law been characterized by no other unfavorable features, the mere readjustments it compelled would have been a serious embarrassment. Though manufactures did not actually decline, they failed to keep pace with increased home consumption. If we assume, as previously, that the cost of wool continued to constitute about half the cost of finished goods to the factory-owner, that Americans could manufacture as cheaply as their foreign competitors, and that the amount of the respective duties was added to the price paid for wool by the manu-

[86] *Niles' Register*, LXI, 147, Oct. 22, 1831.
[87] Wright, *Wool Growing and the Tariff*, 103.
[88] *Senate Doc.* 72, 62d Cong., 1st sess., Part III, 1761.

facturer and for woolens by the consumer, the net protection given our mills under this act was 15 per cent of the foreign values of cloth. Trade statistics show that woolen imports increased greatly while this law was in force, and relatively faster than imports of many other staple manufactures. Presumably a larger fraction of the woolen goods consumed in the country was made abroad than under any previous tariff. Yet when the revision of 1857 placed all wool costing 20 cents a pound or less upon the free list, which was the most liberal provision for the manufacturer since 1816, the importation of woolen goods was not appreciably checked. Moreover, after 1854 the reciprocity duty with Canada had modified somewhat the provisions of the Walker law, by admitting the wool of that country without duty. However, most Canadian wool was suited for making worsteds, a branch of the industry not yet important in America.

Woolen manufacturers believed that the tariff controlled the prosperity of their business. But economic justification for this belief lies rather in the potential than in the actual accomplishments of protection. Domestic producers might have been shielded thus from excessive competition in times of overproduction abroad, but this was not in fact done, as shown by price fluctuations already referred to, and later to be more fully recorded. Duties on raw wool, which are here more particularly in question, seem to have had little effect on the ultimate home supply of this material, especially of those coarser grades which conditions of production in America demanded. Such duties as were enforced from 1816 until 1832, and again from 1846 until 1857, burdened American consumers, and, except as they may have occasioned higher compensatory duties on finished goods, were an even greater burden on manufacturers. They created opposition to protection that otherwise might not have existed, and increased the atmosphere of uncertainty surrounding tariff legislation, thereby adding to the speculative hazards of industry.

Duties on the industrial metals, in their crude or partly manufactured form, were regulated at first with a view to encouraging reproductive rather than primary manufactures. An exception to this rule was lead, which already was mined in Virginia when the Constitution was adopted, and was protected partly for military reasons. Shortly afterwards the Louisiana purchase brought into the Union the mines of Missouri and Illinois. Consequently pig lead was taxed from 1 to 3 cents a pound until 1846, after which it was admitted under a 20 per cent ad valorem duty. Copper, though among the earlier metals mined in the colonies, was not produced extensively within the United States until shortly before the Civil War. Prior to 1846 pigs and plates of this metal were admitted free, and thereafter they were subject to a duty of 5 per cent. As an article used for fastening and sheathing ships, duties affecting copper in these forms were opposed by the ship-building

and navigating interests. Manufactures of copper wares, whose stills and kettles not only supplied a large part of the home market but also were exported to the West Indies, successfully opposed an attempt of the Revere Copper Company, early in the century, to secure a duty on rolled metal.[89]

Iron shared with wool a position of exceptional prominence in tariff controversies and legislation. Even after the Revolution American pigs continued to be quoted in the London market;[90] but as early as 1785 the ironmakers of Pennsylvania petitioned the State to impose a duty on imported bars. This petition was refused on the ground that it would be detrimental to agriculture and manufacturing.[91] When the first Federal tariffs were adopted the memory of our colonial iron exports to England was too recent to permit a general fear that American furnaces and forges would suffer seriously from transatlantic competition. The changes that coke-smelting, puddling, and rolling were to make in the cost of producing and refining iron, and the extent to which these changes for a time would favor Great Britain, were not anticipated. Our imports prior to the period of non-intercourse were not large or unusual enough to cause much concern, and as they indicated the prosperity of local reproductive manufactures and shipbuilding, they were regarded as an occasion for congratulation rather than alarm. To be sure, in 1806 Massachusetts founders petitioned for additional duties on hollow ware,[92] and in 1811 New Jersey and New Hampshire furnacemen asked Congress for higher duties or for the entire exclusion of foreign iron; but the misfortunes recited by these petitioners might be explained by unfavorable natural conditions surrounding their enterprises, which were not general throughout the country.

On the other hand, at first little opposition was manifested by iron-using industries to the moderate tariff upon bars and steel, which were the forms of imported metal they principally employed. Until 1816 the rate of duty on bars and on miscellaneous iron manufactures was equal, and American iron-workers received only such protection as was due to the presumably higher valuation of the latter by customs officers. Iron wire was not taxed until 1813, and pigs were admitted under the lowest ad valorem duty until 1816. Prior to the latter date the tariff on foreign iron was not urged strongly as an argument for higher duties on its manufactured forms. During the period of non-intercourse a number of metal-working industries, long pursued on a small scale in New England and Pennsylvania, extended their markets and attained greater importance. In March 1812, Connecticut wire manufacturers, in urging Congress to protect that industry, based

[89] *American State Papers, Finance*, II, 257, 268.
[90] Quotations dated London, Dec. 3, 1784, in *Massachusetts Centinel*, Mar. 23, 1785.
[91] Swank, *Iron in All Ages*, 495, 496.
[92] *American State Papers, Finance*, II, 171; *id.*, II, 511, 528; *cf.* also *id.*, 553.

their appeal in part on the fact that they used "native ore."[93] The same month certain ironmakers presented a petition asking for additional duties on rolled and slit iron, on the ground that their business was encountering ruinous competition from abroad.[94] In 1814 manufacturers of scythes and mill saws, in Worcester County, sought increased protection. But although unwrought steel at this time was taxed $40 a ton, these petitioners did not advert to that fact in their memorial.[94]

During the high-protection era that began with the law of 1824, opposition to iron duties arose among the ship-builders of Maine and our northern ports,[95] and also among the iron manufacturers of Philadelphia, although that city was the chief seat of high tariff sentiment.[96] Part of this opposition was caused by faulty definitions and classifications in the laws and by administrative rulings apparently violating the broad intent of this legislation, under which manufactured and partly manufactured iron and steel could be imported more cheaply than the materials from which they were made. But such unintentional lapses from a protective policy were not usual or permanent enough to influence the general trend of industry. How far our secondary iron and steel manufactures, considered in the large, may have been hampered by taxes on raw materials, is impossible even approximately to estimate. The influence of such taxes varied with the location of different manufacturing plants. Those removed from tidewater would in any case use domestic iron, the price of which in the vicinity of the works was little affected by foreign competition. In one respect the postion of imported iron in the American market was the reverse of that of steel. The foreign iron subjected to heaviest duties was inferior to that made in America, but foreign steel was superior to the domestic product. Consequently manufactures of cutlery, springs, and the better class of tools and implements were placed at a disadvantage by duties on their raw material irrespective of their location. But the foundrymen and heavy iron manufacturers of Pittsburgh and the Ohio Valley, who supplied a constantly increasing proportion of all the metal products of the country, were unaffected by duties on pigs and bars.

Before 1816 some deviation from the policy of placing iron and its manufactures on an equal tariff footing had occurred, beginning with specific duties on nails and castings, and extending to anchors, and finally to sheet, hoop, and slit iron. But the act of the latter year made

[93] *American State Papers, Finance,* No. 370, II, 553.

[94] *American State Papers, Finance,* No. 371, II, 553; ii, 832.

[95] *E.g., American State Papers, Finance,* V, 756, 757, 846, 894, 895, 898; *House Ex. Doc.* 369, 21st Cong., 1st sess., Hazard, *Register of Pennsylvania,* V, 277, May 1, 1830; McLane, *Report on Manufactures,* I, 1.

[96] *E.g., American State Papers, Finance,* V, 968; *House Ex. Doc.* 226, 21st Cong., 1st sess.; Report on the Blacksmiths' Petition, Feb. 28, 1831, in *Sen. Ex. Doc.* 67, 21st Cong., 2d sess; Hazard, *Register of Pennsylvania,* VII, 354–357, June 4, 1831.

a new departure by levying special and relatively heavier duties on bars, and by discriminating between those which were rolled and hammered. The latter measure was intended not only to protect American forge-owners, but also to discourage the importation of rolled iron, which was refined by the puddling process and was considered inferior both to native bloomery and charcoal-refined bars, and to hammered bars imported from Russia and Sweden. By this law rolled iron was taxed $30 a ton and hammered iron $9, which was equivalent to increasing the preceding duty on rolled iron about 15 per cent and decreasing that upon hammered iron about 20 per cent. However, two years later the latter duty was raised to $15 a ton, making it equivalent to 20 or 25 per cent ad valorem, based on prices then prevailing in the Baltic countries. The tariff on rolled bars remained unchanged until 1828, when it was increased to $37 a ton.[97] In 1832 it was restored to $30, and after the reductions of the compromise law was placed at $25 by the act of 1842. As iron had fallen in price this was higher, estimated on an ad valorem basis, than some of the earlier rates.

Except for the four years the law of 1828 was in force, and during the last years of the compromise act, our early tariffs taxed hammered iron $18 a ton. In 1828 this was raised to a cent a pound, and in 1842 the duty was changed to $17 a ton. The tariff of 1846 abolished the old discrimination between rolled and hammered bars, by taxing this metal in all its manufactured and unmanufactured forms at the uniform rate of 30 per cent. Any difference of quality between the two kinds of bars that may have existed in 1816 had long since lost its earlier importance. The actual reduction in duty amounted to fully one-half, but it followed shortly upon a revival of duties on railroad iron, then one of our principal metal imports, which between 1831 and 1844 had been remitted.

Though several forms of partly manufactured iron, such as sheets, rods, hoops, chains, and castings, had been protected by specific duties higher than the duties on their raw material, it was not until 1846 that the rate on hardware, which so far as imported came mostly from England and was made of rolled iron, equaled the duty on British bars. The result seems to have been unfavorable to our reproductive iron manufactures, especially those of small goods; for, as we shall see, iron prices in the United States continued to be higher than those in Great Britain by a margin exceeding the American duty. Some indication of this influence is afforded by the relative importation at different periods of iron in manufactured and unmanufactured forms. Under the tariff of 1818, for every dollar's worth of raw iron we bought abroad we imported $1.50 in iron manufactures. During the tariff of 1824 this ratio rose to $1.58, and during that of 1828 to $1.65, which

[97] This was regarded as a discrimination against British iron and was met by a threat of retaliatory duties on American cotton; Great Britain, *Parliamentary Papers*, 1828, XIX, 12.

is the maximum for this period and corresponds with the era of highest iron duties.

While the compromise law of 1833 was in operation the ratio of manufactured to unmanufactured iron imports declined, but this may have been due to the inclusion in the latter class of rolled bars for railways, upon which duty was remitted. After 1840 statistics enable us to exclude railway iron from both sides of the computation, making figures comparable with those prior to 1830. With this correction, the value ratio of iron and steel manufactures to unwrought iron and steel imported fell from $1.47 of the former for every dollar of the latter under the tariff of 1842, to $1.42, under the law of 1846, and $1.11 under the act of 1857.[98] But it would be a hasty inference to ascribe this decline entirely or principally to legislation. Cheaper processes for making iron in America, cheaper inland transportation, and the more extensive application of labor-saving machinery to metal-working, stimulated this group of manufactures, and doubtless increased in different degrees our home demand for wrought and unwrought iron respectively, regardless of the duties levied upon them.

Departing for a moment from the consideration of relative duties on raw materials and their manufactures, before we conclude this review of the iron tariff a reference is pertinent to its effect on primary production. After 1816 the specific duty on pigs and bars was very high and was added regularly to their price in America. Between 1816 and 1860 imported iron is supposed to have supplied an approximately constant share of the domestic market. Evidently, protective duties, though at times reaching 100 per cent on foreign values, did not enable American furnaces and forges to satisfy domestic consumption; yet the industry was expanding, improving in technique, and extending to new localities. Compared with the progress of other nations than Great Britain, the United States was not a laggard in iron production. One reason why prices continued high and imports large was that the country was developing so fast that demand constantly outstripped supply. More important than this, however, was the fact that after coal became essential for producing and refining iron cheaply, America had to wait on the development of transportation facilities in order to compete with Great Britain and Europe; for the assembling of coal and ore at points from which iron could be marketed economically was not possible on a large scale until the railway era.

After seaboard forests in the vicinity of iron ore had been exhausted, even charcoal iron could not be delivered at tidewater by American furnaces as cheaply as by those of Europe. When the tariff of 1824 was under discussion, Daniel Webster, after alluding to the fact that freight from Stockholm to Philadelphia was no more than from points 50 miles inland to that city, and that wages in Russia were but 7 cents

[98] Compiled from *Commerce and Navigation Reports.*

a day—they as yet hardly exceed that amount at some of the Ural smelters—described the relative competitive advantage of Baltic and of Pennsylvania ironmakers as follows:

"Stockholm, therefore, for the purpose of this argument may be considered as within fifty miles of Philadelphia. Now it is at once a just and a strong view of this case to consider that there are within fifty miles of our market vast multitudes of persons who are willing to labor in the production of this article for us, at the rate of seven cents per day, while we have no labor which will not command upon the average at least five or six times that amount."[99]

Labor probably constituted two-thirds the cost of making bar iron; and if wages were as five to one in Russia and America, it would have required a duty of more than 250 per cent on the European valuation to have equalized this condition. Comparative prices in the two countries show that no such disparity existed, or else that Russian and Swedish forgemen were able to secure enormous profits on their business. Probably Webster's information related to cash wages, and not to wages plus subsistence. The actual difference in quotations between Swedish and American ports, including the duty, was between 50 and 65 per cent of the price abroad.[100] The difference was enough, however, more than to overcome the amount of protection Congress was willing to give our own furnaces and forges.

In 1831 only one-sixteenth the iron used by Maine blacksmiths and nail factories was of American origin.[101] Massachusetts machine-make and metal-workers, in reporting to the Secretary of the Treasury the same year, almost without exception stated that they used imported iron and steel.[101] In 1846 a New London hardware manufacturer informed Secretary Walker that his establishment used about equal amounts of American and British pig and bar iron.[102] The tariff on iron and steel was therefore a burden to metal-using industries, without assuring at any time during the period we are considering an adequate domestic supply of those materials.

Tanners, who continued to import hides, as in colonial days, obtained them without duty until 1842, when a rate of 5 per cent was laid upon them. This continued until 1857, when it was reduced to 4 per cent. Leather was taxed from 7.5 per cent under the first tariff laws to 35 per cent during the war with England. After the war the duty was continued at 30 per cent, except for reductions under the compromise act, until 1842, when a new departure was made by taxing sole and common leather 6 cents a pound and upper leather 8 cents. Four years later these duties were restored to an ad valorem basis at 20 per cent, and reduced to 15 per cent in 1857. None of these duties

[99] *Annals of Congress* 2065, 18th Cong., 1st sess., quoted in Stanwood, *American Tariff Controversies*, I, 234.
[100] *Sen. Doc.* 21, 62d Cong., 1st sess., 328.
[101] McLane, *Report on Manufactures*, I, 2; *e.g.*, *id.*, I, 161, 193, 349, 571, 573.
[102] *Sen. Doc.* 72, 62d Cong., 1st sess., Part III, 1747.

affected tanning or leather manufacturing, for with free hides Americans produced this material cheaper than their competitors. Boots and shoes were protected by almost prohibitory specific duties from the beginning of the Republic until 1846, after which they were treated as other leather manufactures. Articles of the latter class were dutiable at the same rate as leather until 1842, when they were continued under ad valorem classification of 35 per cent, while leather itself incurred specific duties. In 1846 they were taxed 30 per cent, which rate was reduced to 24 per cent in 1857. Saddles and harness usually were an independent item. Although some leather goods always were imported, and now or then a petition relating to duties was presented to Congress by tanners or manufacturers, the influence of the tariff on this branch of industry was unimportant.

Among industries that have diminished so much in relative, if not in absolute importance, that their earlier prominence has been forgotten, is the manufacture of candles. Tallow chandlers, like tanners, had gone abroad for some of their materials while the country still was subject to Great Britain. After the Revolution they gradually recovered the ground they lost during hostilities and reëntered the West India market with their products. As late as 1832 they protested against a duty of 1 cent a pound then levied on imported tallow, upon which no drawback was granted when it was reëxported in the form of candles or soap.[103] A drawback of the whole duty of 5 cents a pound upon candles was allowed when these were reëxported, with the result that American merchants brought them from Russia for reshipment to the West Indies and South America.

Rum-distilling has been alluded to previously as one of the few colonial manufactures that were entirely dependent on imported raw materials. At that time part of the molasses used by American distilleries came from other possessions of Great Britain, but subject to duties levied by the mother country. These duties had been such a grievance that the clauses of the first Federal tariff relating to sugar and molasses inherited some of their unpopularity. New England was especially sensitive on this subject. But revenue consideration so obviously demanded a duty on these commodities that the question of taxing them was merely one of degree. Furthermore, from the first an ample margin of protection was granted, with express design, to distillers and refiners.

After the purchase of Louisiana, which already was producing sugar when it became part of the United States, the desire to protect a domestic product was added to earlier motives affecting the tariff treatment of those articles. Meanwhile, a grain-distilling interest had grown up, supported by farmers whom it patronized for its raw materials, which looked upon rum-making as a competing industry.

[103] *Cf.* McLane, *Report on Manufactures*, I, 89.

These two influences continued to make for a high tariff on molasses. On the other hand, such a tax affected thousands of household users as well as manufacturers; for relatively to sugar, molasses was consumed more largely than at present. In addition, for several years distilling paid an internal-revenue tax, from which most other branches of business were free, and received compensation for this in relatively low duties on the raw materials it used, as compared with those upon competing spirits from abroad.

In the hands of a skilled distiller a gallon of molasses derived by the old muscavado process would make a gallon of rum. Probably in general practice the yield was slightly less, because inferior and soured molasses was worked up by the distillers and because economy of marketing demanded, and improved technique made possible, the manufacture, as time went on, of higher-proof spirits, which required relatively more molasses for their production.[104] Partly compensating this was the fact that Cuban planters, in order to evade American duties on raw sugars, increased the sugar content of their molasses, so that it ran up to 8 pounds or more a gallon.[105] Between 1789 and 1808 the duty on molasses was raised gradually from 2.5 to 5 cents a gallon, and except during the War of 1812, and for two years between 1828 and 1830, it remained at the latter rate until 1842.

In response to the protests of Louisiana planters against the evasion of the sugar duty just mentioned by West Indian shippers, who sent into the United States, in the form of molasses paying 5 cents customs dues, sugar that imported in its raw state would have paid 20 or 25 cents, a provision was inserted in the tariff of 1832, and continued ten years later, levying special duties on cane sirups.[106] By the law of 1842, molasses was taxed 4.5 mills a pound, which was virtually 5 cents a gallon, and therefore made no change in the long-accepted rate. Consequently, up to 1846 the duty on molasses always had been specific, and with unimportant and temporary exceptions had been nominally uniform, though rising as computed in ad valorem ratios. Meanwhile the duty on proof rum, which was taxed somewhat less than whisky, after having been placed at 10 cents a gallon by the first tariff and increased to 22 cents in 1791, was raised by a number of steps until it reached 57 cents between 1828 and 1842, and 65 cents from the latter date until 1846.[107] The Walker tariff taxed imported molasses 30 per cent ad valorem and spirits 100 per cent. In 1857 these rates were reduced to 24 and 30 per cent respectively, which was the first time in the course of this legislation that the adjustment of duties had not greatly favored distillers. Such favor, however, had been partly acci-

[104] *American State Papers, Finance*, v, 839.

[105] Stevenson [Pennsylvania], *speech in U. S. House of Representatives, Mar. 5, 1828*, 20; *cf. Sen. Doc.* 72, 62d Cong., 1st sess., Part III, 1948, *et seq.*

[106] United States, *Tariff Laws*, 93; *Statues at Large*, IV, Chap. 227, 17.

[107] *Cf. Sen. Doc.* 72, 62d Cong., 1st sess., Part II, 1591, *et seq.*

dental, for relatively to other industries rum-distilling soon lost its earlier importance, and spirit duties were regulated by revenue rather than protective considerations. Foreign competition came chiefly from across the Atlantic, as after the abolition of slavery in the British colonies West Indian distilling declined. However, American grain-distillers were reaching out for a share of the foreign trade, and for a time threatened to absorb the market vacated by the decaying industry of Jamaica and the other sugar islands.[108]

So much of the rum produced in America was sold outside the country that it was one of the few commodites in regard to which the drawback policy of the government was important. When rum manufactured from imported molasses was exported, the duty paid or due upon the latter article was remitted. The only specific departure from this custom prior to 1846 was made in 1828, when the molasses drawback was repealed in connection with other provisions already alluded to as directed purposely against New England. This change of policy enabled British competitors to capture for a time New England's flourishing rum business with the Baltic and Mediterranean countries, and may have reacted remotely on that chain of commerce by which iron returned to America from Russia and Sweden, and wool from Spain and the Levant.[109] But a speedy amendment to the law, in 1830 restored the old conditions, and thereafter the interests of liquor distillers and the tariff were never in serious conflict.

Sugar-refining stood in the same relation to the tariff as distilling. It imported its raw materials, its prosperity was supposed to be conditioned by a foreign outlet for its surplus product, and at times it was burdened by heavy internal taxes. Therefore its existence depended on tariff discrimination between raw and refined sugar, and its ultimate extension upon drawbacks that permitted foreign sugar to be refined in the United States for foreign consumers without the payment of duties. These needs were recognized from the beginning of our tariff legislation, for refining was already an established industry, and manufactures founded on the West Indian trade were solicitously fostered, not only as desirable in themselves, but also because they encouraged foreign commerce, which was at that time the pet interest of the government.

Our first tariff laws recognized three classes of sugar: raw or brown, clayed or partly refined, and lump, loaf, or refined. The act of 1789 taxed these 1 cent, 1.5 cents, and 3 cents a pound respectively. Until 1842 clayed sugars usually were dutiable at a cent a pound more than raw; after that sugars above the grade of raw were merged in a single class. Under the earliest laws refined sugar was taxed about three times the rate of raw sugar. In 1816 the margin of duty between raw and lump sugar was made 7 cents, and between raw and loaf sugar

[108] *Sen. Doc.* 72, 62d Cong., 1st sess., Part 1, 351.
[109] *London Commercial Report*, 1829, quoted in *Banner of the Constitution*, 1, 238, Mar. 31, 1830.

9 cents. This margin was increased in 1832, but was reduced to 3.5 cents for all grades in 1842. The Walker law and its successor taxed raw and refined sugar at the same rate ad valorem. This was equivalent to specific taxes on the two qualities in about the ratio of 1 to 3; but as both duties were radical reductions from preceding rates, the margin of protection afforded by the difference between these duties was less than previously. Clayed sugar was mixed with brown for refining, and so was from one point of view a raw material; but it also was consumed largely in place of refined sugar, and so displaced the latter in home consumption.

The first excise on sugar refined in the United States was established in 1794 and continued until the middle of 1802.[110] It was renewed in 1813, as a war-revenue measure, and was repealed again in 1817. While in operation it reduced the protective effect of duties by the amount of the excise, and this was taken into account by imposing an almost prohibitory tariff on competing sugar of foreign origin.

No drawback was granted on domestic refined sugar until the excise law of 1794 was enacted. It was then provided that the internal revenue tax of 2 cents a pound should be refunded when such sugar was exported, plus 3 cents a pound additional, which represented the duty on 2 pounds of imported raw sugar, supposed to be required to make 1 pound of refined. When the excise was abolished, in 1802, the entire drawback was repealed, including that refunded on account of duties on raw sugar used in manufacture. A vigorous appeal for its restoration was refused, partly on account of administrative difficulties, as it was feared that Louisiana sugar, which had paid no import tax, would be used in refining and thus secure a virtual bounty upon being exported. In reporting adversely upon this question the committee on manufactures stated that "sugar refining has been more favored by Government than, perhaps, any branch of domestic manufacture."[110] Again, in 1805, New York refiners petitioned for a restoration of the drawback. In reporting unfavorably upon this request the committee stated that, contrary to general good policy and to the usual custom of the government, refiners were given a monopoly of the domestic business by prohibitory duties on competing sugar, and by the fact that refined sugar imported was not, like other imported goods, subject to a drawback when shipped out of the country.[110] Three years later six firms of refiners in Baltimore again urged the restoration of the drawback, stating that its abolition had cut Americans off from the profitable markets they had developed in the West Indies, the Mediterranean countries, and in other parts of Europe; and that Great Britain, pursuing a policy contrary to that of the United States, was encouraging her refiners by bounties and tariff regulations to produce for foreign markets.[110] However, no change was made in the policy adopted

[110] *American State Papers, Finance*, II, 29, 74, 116, 268.

in 1812 until the new internal-revenue law of 1813 was passed. That act provided for refunding the tax which it imposed, of 4 cents a pound, when domestic refined sugar was exported. In 1816 the drawback was increased to cover also the duty paid on raw sugar used in refining. Both excise and drawback were repealed the following year; but in 1818 the latter was restored at 4 cents a pound, to cover the estimated duty on raw sugar.[111] A new law, in 1829, raised the drawback to 5 cents a pound, at which point it remained for more than ten years, regardless of variations in the duty on raw materials. Under existing conditions of sugar production and refining this drawback came to exceed the amount required to compensate for duties on raw sugar, and was in effect a bounty to exporting refiners.[112] America brought sugar from the East Indies and the Philippines to refine for consumers in Naples and Sicily.[113] This condition was changed when the drawback was reduced to 3 cents in 1841 and to 2 cents the following year. The tariff law of 1842 fixed the drawback upon refined sugar at a rate, to be ascertained and prescribed by the Secretary of the Treasury, equivalent to the duty on the raw sugar from which it was made.[114] The term "bounty" continued to be applied to this refund. Its effect was the same as if raw sugar had been admitted free in bond for refining.

Our foreign sales of domestic refined sugar were small, compared with home consumption, and after 1840 were mainly to South America. The amount paid for drawbacks indicates that between 1794 and 1802 were exported yearly less than 75 tons. From 1821 to 1828, when the 4-cent drawback was in force, our annual exports were less than 40 tons; but between 1829 and 1841, during the operation of the 5-cent bounty law, they rose to 1,700 tons.[115] The last years of this period were exceptionally prosperous for refiners, who were able to ship to foreign markets in a single season nearly 5,000 tons of refined sugar. Under the readjustment of 1842, which made the drawback balance the duty paid on raw materials, these exports immediately declined, indicating that the previous nominal refund had been a true bounty. Though exports recovered gradually during the following two decades, they did not attain their former figure prior to the Civil War. As refiners were protected amply in their own country by higher duties on refined than on raw sugar, the principal effect of the drawback was to enable them to hold up prices at home, by shipping abroad at a profit any surplus likely to depress the domestic market. Furthermore, the sugar trade was a seasonal one, and a foreign outlet in times of slack interior demand made it easier to keep plants continuously employed.[116]

[111] *American State Papers, Finance*, v, 695.
[112] *Sen. Doc.* 72, 62d Cong., 1st sess., Part i, 84, 85.
[113] *Sen. Doc.* 21, 62d Cong., 1st sess., 522, 523.
[114] *Sen. Doc.* 72, 62d Cong., 1st sess., Part ii, 1590; *cf. Sen. Ex. Doc.* 50, 30th Cong., 1st sess. 305–308.
[115] *Sen. Doc.* 72, 62d Cong., 1st sess., Part i, 87.
[116] *Sen. Doc.* 21, 62d Cong., 1st sess., 523.

SPECIFIC AND AD VALOREM DUTIES

Shortly before the Civil War, when a low ad valorem tariff had been in operation longer than any previous act in the history of the country, and protection and free-trade controversies seemed to have been allayed, Senator Benton, of Missouri, who ranked with moderates upon these questions, thus summed up and incidentally indorsed the earliest theories of our legislators in regard to this branch of public policy:

"Madison compressed into 22 short lines of 8 or 9 words each all the principles of impost and tonnage duties which have governed all wise legislation upon the two subjects from that time to the present, namely: specific duties the rule, ad valorem the exception, revenue the object, incidental encouragement to home industry the incident: specifics on all the leading and staple articles, ad valorem on the inferior remainder: discrimination between articles of luxury and necessity so as to put the burthen on the former, and between articles made or not made at home so as to give encouragement to the home article: and all these duties moderate so as not to shackel trade or agriculture."[117]

From this philosophy of tariff legislation protectionists adopted certain principles and their opponents others. None of these was more important than the character of the duties imposed on imports. Advocates of protection sought to make specific duties not only the rule, but almost universal, while the friends of a low tariff strove to reduce all duties to an ad valorem basis. The main argument in favor of specific duties was that they prevented the importation of foreign goods at less than the legal tariff rate through fraudulent undervaluation. Opposition to these duties centered in the fact that, being uniform for all qualities of articles, they taxed heaviest cheap and medium goods consumed by the mass of the people, and lightest those finer and expensive grades which rank among luxuries rather than necessities and are purchased by the wealthy or extravagant. A third class of duties, nominally ad valorem but rated on minimum valuations, were in effect graduated specific duties; and this system was designed to steer a middle course between the evils of the other two, by checking—though it did not overcome entirely—fraudulent undervaluation, and at the same time taxing less the necessities of the common people than the conveniences and luxuries of a wealthier minority.

Our first specific duties were imposed principally because they enabled the amount of customs revenue to be anticipated more accurately than those levied ad valorem. Returns from such duties are conditioned solely by the volume of trade, while those from the latter can be predicted only by assuming values for two unknown quantities, the amount of imports and prevailing prices. Therefore, until the treasury acquired experience in estimating its prospective income,

[117] Thomas H. Benton, in *Abridgment of the Debates of Congress*, I, 7.

this administrative consideration was an important one, to which motives of protection were quite subordinate. Nevertheless, in the imposition of duties, as already shown, regard was paid to existing manufactures by placing them in specific rather than ad valorem schedules.

By 1816 American manufacturers were becoming educated as to the effect of each class of duties upon their own interests, while as yet the general public was uninformed or apathetic as to their influence upon consumers. At that time little opposition developed to specific duties as such, though their inapplicability to commodities having a wide range of value, such as woven fabrics, was generally recognized. The introduction of minimum valuations at this time was an opportunist measure, intended to protect cotton manufacturers by excluding cheap East Indian goods and undervalued British manufactures. As we have seen, such valuations were not extended to woolens until twelve years later, and were retained in that schedule but four years. On the whole, specific duties were more generally applied to raw materials, including in this category iron and steel, than to secondary manufactures; and minimum valuations, although they were a matter of much controversy, had little permanent effect on any industry but cotton manufacturing. All duties except ad valorem tended to rise, in respect to the price of the commodities upon which they were levied, with lowering costs of production; and as such costs were declining with unusual rapidity during these years, on account of new inventions and improved communication, any fixed duty was apt to become more highly protective the longer it remained in force. This was particularly true of minimum cotton valuations.

When, in 1816, the tariff provided that all cotton cloth imported into the United States should be assumed to be worth at least 25 cents a yard, substantial cloth could not be manufactured much below that figure. Therefore the duty then established, at 25 per cent, was a true ad valorem duty, except upon certain inferior grades of East Indian calico, that it might be thought wise to exclude for the welfare of consumers as well as of manufacturers. However, within a very few years both the price of cotton and the cost of manufacturing had so fallen that good cottons could be made for less than half what they had cost when the law was enacted. Consequently the tariff gave a monopoly of the home market for cheaper grades of cloth to domestic manufacturers. As the minimum was increased, by the protective acts of 1824 and 1828, this monopoly was extended to finer fabrics, and encouragement was given to printing calico.[118] A few yarn-mills were put in operation in the South, and for a time some incentive was given to the manufacture of homespuns in that region. On the whole this branch of manufactures responded to the peculiar tariff treatment

[118] McLane, *Report on Manufactures*, I, 929.

afforded it. In general those industries, such as the making of glass, paper, and powder, and of boots and shoes, which were protected uniformly by specific duties, seem to have enjoyed more even prosperity than industries subject to ad valorem tariffs. However, allowance must be made for the fact that duties of the former class were granted earlier, and were maintained more easily, upon manufactures for which the country possessed natural advantages, than upon manufactures whose introduction and support required artificial encouragement.

INFLUENCE OF THE TARIFF ON MARKET STABILITY

Some ramifications of tariff influence upon industry derived their importance as much from psychological as from strictly economic causes. Early generations of Americans lived in the atmosphere of business optimism characteristic of a new and growing country. To those of the North an inherited spirit of commercial adventure, cultivated by the hazards of the sea, gave courage to encounter the even greater uncertainties of industrial speculation. Faith in the potency of legislation to control economic forces was even more out of proportion to its performances than at present. In this state of mind the precarious nature of government favor was overlooked. Even the prospect of a protective law turned attention to new fields of enterprise, and before the probable effect of such a statute could be measured, its passage sometimes resulted in the erection of new factories and furnaces that more than supplied the margin of market reserved by its provisions for home producers. No question exists as to the efficacy of protection in stimulating industrial investment. Testimony is universally on that side and is corroborated by the evidence of specific facts and figures; but there is uncertainty as to the final effect on manufactures. Undertakings financed in the midst of a boom often absorbed capital unprofitably that under normal conditions would have been productive. In order to make such enterprises pay, additional duties were sought, and the protective system thus created conditions that added to its own demands.

On the other hand, periods of expansion that can not be attributed to tariff legislation occurred in the manufacturing history of other countries; and in the United States it is sometimes impossible to associate crises of industrial activity or depression with the enactment or discussion of tariff laws. Those who advocated additional protection for cottons, in 1824, claimed that between 1820 and 1822 so many mills had been erected that the market was oversupplied with domestic goods, which were sold cheaper than they could be imported customs free; and duties were asked that would enable manufacturers to employ their surplus spindles on finer fabrics.[119] Nathan Appleton, who spoke with authority of conditions in large establishments, stated that prior

[119] *Niles' Register*, xxv, 290, Jan. 10, 1824.

to 1825 profits in this industry were everywhere so high that "cotton manufacture, during the long period of its prosperity in England, would have been a highly profitable manufacture in this country, after acquiring the necessary skill, even without any protection at all." He cited as "a well-known fact," that from the time the power loom was introduced successfully for making coarse cottons, until 1825, which roughly covered the four or five years just referred to, "many leading manufacturers considered the tariff as of little or no importance.[120]

While the period of expansion just described was not coincident with a tariff law, the passage of the act of 1824, which added to the protection previously accorded this industry, chanced to inaugurate a period of depression. This was due to the reaction that in both America and England followed the prosperous years just mentioned. The extension of the minimum by the tariff of 1828 induced many manufacturers to change from coarser to finer fabrics and thus relieved the overloaded market. But as prices rose more spindles were brought into operation, and production was so stimulated that a short two years saw another overstock of domestic goods. Recovery from this condition was not due directly to tariff relief. The large quantities of unsold white cloth in the domestic market encouraged print works to extend their operations sufficiently to absorb this surplus. Woolen manufacturers, though they did not receive the protection anticipated from the tariff of 1824, about that time enlarged their plants and established new ones, apparently encouraged by the general prosperity of the country and by a contagious spirit of enterprise. The President, referring to the tariff of 1828 in his annual message the following year, remarked that "domestic competition under an illusive excitement has increased the production much beyond the demand for home consumption. The consequences have been low prices, temporary embarrassment, and partial loss.[121] In 1832 Samuel Slater opposed raising the minimum valuation on cotton goods, believing that profits would not be increased on account of added domestic competition.[122] Through the scattered testimony collected by treasury agents from manufacturers, about the same date, there is apparent more distrust than confidence in tariff changes. No doubt this attitude was prompted in part by fear that such changes might be undertaken in a hostile spirit, but it was in a measure due to dread lest the added competition of neighbors be a greater evil than existing competition from abroad.

Occasional periods of over-production continued to embarrass American manufacturers after 1832, but subsequent tariff laws were likely to discourage rather than promote this tendency. Outside of three or

[120] *Banner of the Constitution* [signed "Statist"], II, 208, May 25, 1831.
[121] *Sen. Doc.* 1, 21st Cong., 1st sess., 9; *cf.* McLane, *Report on Manufactures*, I, 81.
[122] McLane, *Report on Manufactures*, I, 931.

four industries, individually of great importance but even in their total representing only a fraction of the whole manufacturing activity of the country, investment and production seldom were stimulated appreciably by legislation. Uncertainty as to future tariff policies—after the disillusionments of 1824 and 1828—made manufacturers cautious, and they learned to discount the positive advantage conferred through any act by the probability of its amendment or repeal. This influence, like the preceding, affected chiefly two or three industries, which were made the football of opposing sides in the protection controversy. In 1832 a Connecticut cotton manufacturer protested thus vigorously against the constantly recurring tariff changes:

"Governmental protection to *any* interest, in order to be really beneficial, must have something like *permanency*, some reasonable *stability* to it. The unstable and portentious aspect of our protective system is sickening, and almost disgusting."[123]

A British manufacturer, who was making flannel in Pennsylvania, attributed his losses to the same uncertainty.[123] Great Britain and the United States presented a contrast, in regard to the relative permanence and consistency of their laws affecting manufactures, unfavorable to the latter country. In 1850 a convention of American iron-masters thus commented upon this situation:

"The most striking comparison between the legislation of Great Britain and that of the United States is the steadiness of the former * * * and the vacillation of our own measures. Our business, instead of being steady and regular, is converted into a species of adventure * * * the investment is no sooner made, and several hundred families gather around the works looking to them entirely for their support, than the law is changed, or what is almost as bad in its effects on all parties concerned, a change is talked of."[124]

The consequences of this instability were far-reaching. If the prospect of high duties sometimes induced adventurous capitalists to embark money, on speculation, in manufacturing undertakings, agitation for the repeal or reduction of duties shook the credit of manufacturers, caused their capital to shrink, and even if the proposed legislation did not in fact occur, threatened the security of their enterprises. When, during depressions caused by threatened or enacted laws, factories were closed temporarily, labor in the United States was apt to move to new localities or to enter other occupations. As a body of skilled employees trained to the ways of certain employers and to the methods and machinery of a given manufacturing plant are a valuable asset to an establishment, the losses incurred by such crises and suspensions were sometimes irrecoverable.

We have seen that the first incentive was given to the protective movement that ultimately controlled Congress from 1824 to 1832, by

[123] McLane, *Report on Manufactures*, I, 1001; II, 217; *cf. id.*, 222.
[124] *Documents Relating to the Manufacture of Iron in Pennsylvania*, 25.

heavy importations from Great Britain at a time of crisis in that country. A second transatlantic crisis flooded American markets with foreign manufactures in 1825. Similar but less overwhelming waves of European merchandise swept over the ocean to America in subsequent periods of distress abroad. These were not novel occurrences. They had happened at fairly regular intervals before the colonies were independent, and before the industrial revolution had created the new conditions of production that account so largely for the erratic prosperity of manufactures during the early nineteenth century. In part such over-stocks were due to slow methods of communication, that prevented news of market conditions in America from reaching foreign shippers in time to prevent an unprofitable accumulation of goods on this side of the Atlantic. In part they resulted from causes more fully treated in the preceding chapter. Their pertinence here is due to the fact that American manufacturers sought protection from the uneven competition these crises created, more than from average or normal competition. The belief was widely current that British manufacturers, in order to prevent their surplus product from depressing prices in their own markets, found it profitable to sell abroad the margin above domestic demand, even at less than cost of making.[125] It was argued that if goods worth $10,000,000 in excess of local needs out of a total product of $100,000,000, would depress prices 20 per cent if sold where they were made, they might more profitably be sold elsewhere at any price they would bring, even though it be but a fraction of their true value. Factory-owners also feared that their British rivals might take advantage of superior experience and technique to displace domestic manufactures in our markets with imitations, inferior in quality but so well contrived as to deceive consumers.[126]

This fear of unfair foreign competition in its different phases was a real and ever-present fact in the country's early industrial sentiment. It was supported in some degree by traditional political antipathies to Great Britain, but it seems to have been as strong among our manufacturers of English birth and traditions as among those of native stock. Therefore, in appraising the influence of the tariff on industry at this time, account must be had not only of the actual effect of these laws in checking such competition, but of the extent to which they removed the dread, warranted or unwarranted, that manufacturers felt of its results. No statistical measure for this influence exists. But it is revealed in the added investments in manufactures, already mentioned, when the early protective legislation was enacted.

However, control of home markets never was realized through protection, at least in the degree promised by politicians and anticipated by industrial investors. Our general evidence upon this point is lim-

[125] McLane, *Report on Manufactures*, I, 936, 969.
[126] See 240–241, preceding.

ited to trade statistics and is based on the assumption that volume of imports measured the pressure of foreign competition. If we regard, first, fluctuation of imports, we find that annual variations in our per capita purchases abroad were greater in periods of high tariff than of low tariff. If we consider the average volume of per capita imports, we find this varying quite erratically in relation to average rates of duty, but more consistently in relation to currency inflation and to the production in America of the precious metals.[127] The growth of domestic industry did not, at least during the period now under consideration, dominate other more powerful commercial influences that continued, as in colonial times, to determine the ebb and flow of transatlantic trade.

It is not practicable, nor would it be illuminating as applying to such a broad and general survey of the whole field of manufactures as must be taken here, to follow the ramifications of tariff influence into the detailed evolution of particular industries. Apparently contradictory results would be discovered in different instances, suggesting that the most acute analysis is likely to overlook factors important in individual cases but not common to the entire problem. The total effect of protection was to encourage manufactures; some early outgrew the benefits of this influence; others continued to be sustained solely by its support; others were more hampered than aided by the complex of conditions with which this legislation surrounded their operations.

PATENT LEGISLATION

Congress early exercised its constitutional authority to protect inventors by passing a general patent law, which went into effect April 10, 1790.[128] Under its provisions, said to have been inspired by Jefferson, applications for patents were acted upon by a commission consisting of the Secretary of State, the Secretary of War, and the Attorney-General. The commission could reject claims that were not in its opinion "sufficiently useful and important." This discretionary power they applied so strictly as to make the act unpopular, and three years later it was superseded by a more liberal law. Under the new statute the Secretary of State alone granted patents, but his authority to refuse this privilege was so curtailed as to make him little more than a recording officer. For forty-three years patent rights were issued to practically every applicant without any examination into the merit or novelty of his inventions. Consequently conflicting and fraudulent patents were numerous and occasioned an immense amount of litigation. These evils became so pressing that they caused a thor-

[127] Appendix, VIII.

[128] *History of the Patent Office;* Learned, *The President's Cabinet,* 309–313; Hunt, *The Department of State,* 117–122.

ough revision of the legislation in 1836, and from that year dates the modern patent system of the country.[129]

In addition to creating a patent bureau, with a larger and better organized personnel than previously, the act of 1836 provided that patents should be issued only after examination and proof of merit and originality. Provision was made also for the filing of caveats, to protect the rights of inventors while they were maturing their inventions. Following a practice as to time that had been established in earlier English and colonial laws, the term of patents hitherto had been fourteen years. An extension of seven years more was now provided, if claimed and justified by the patentee at the expiration of the original period. The system of filing plans and models of new devices and machines, which had existed from the beginning, was elaborated, and the bureau was provided with a technical library and other equipment for its work. With unimportant modifications the law of 1836 remained in force until after 1860.

During the three years that the original act of 1790 was in operation, 67 patents were granted. Some of these covered processes and devices of earlier origin, for the protection of which there previously was no provision. The average number of patents issued annually increased more than twenty-fold between the decade ending with 1800 and that ending with 1830. Under the loose provisions of the law then in force these figures were hardly an index to the progress of invention. The United States granted more patents than England and France together; in fact, the number yearly issued in America between 1820 and 1830 was 535, as compared with 145 in Great Britain. However, even under the stricter examination established by the law of 1836, the number continued to increase, so that it averaged 646 a year between 1841 and 1850 and 2,525 a year for the following decade.[130]

Despite the fact that our legislation for many years did not sufficiently safeguard inventors, and did hamper industry by causing unnecessary litigation among patentees, its general influence was favorable to manufacturing progress. The first patent issued was for a process of making potash. For some years improvements in agriculture implements received much attention from inventors, and 65 models of improved plows had been deposited with the government before 1823. Excepting the cotton gin, which was really a farm machine, no invention of revolutionary importance to manufacturing itself was recorded. But our laws encouraged the perfection of many minor improvements that in the aggregate contributed greatly to the technical advance of the country. The aristocracy of invention might hope to receive reward under any system of patents; under the American

[129] United States, *Laws of 1839*, Chap. 88.

[130] *History of the Patent Office*, 10; *cf. Sen. Doc.* 58, 24th Cong., 2d sess.; *Sen. Doc.* 105, 25th Cong., 2d sess.; *American Quarterly Register*, II, 404–406, June, 1849.

system a democracy of small inventors was encouraged to coöperate in perfecting the industrial equipment of the nation.

Individual discoveries and improvements of first importance rose out of this condition, as great men arise in a democracy, and possessing more dramatic interest engaged our chief attention; but the distinctive feature—if such there be—of American inventive genius has been its diffusion through all ranks of labor. This quality was noted by European observers among the colonists before we had patent laws or mechanical industries; so it is to be regarded as a product possibly of race, and more certainly of physical and social environment, rather than of legislation. A liberal patent system was a symptom or product of this quality of the people, rather than its cause; but like many other social products it fostered the conditions that created it.

The influence of invention upon manufactures between 1790 and 1860 embraces many aspects unrelated to patent laws. Community of intelligence among different people was already so well established that technical progress was international. Details of that progress are studied profitably only in connection with the particular industries which they affected. Any attempt to measure, or to work out in its separate ramifications, the part that a single branch of legislation played in this movement, leads to unconvincing, because inadequately grounded, conclusions. The complex of economic forces is too intricate to be unraveled in this fashion. But the promise which our patent system held out to inventors as a reward for their efforts stimulated useful inventions, hastened the perfection of mechanism, caused the early introduction in America of improvements that under different conditions might first have been employed elsewhere, and thus hastened our industrial progress and strengthened us in competition with other nations.

CHAPTER XIII

RAW MATERIALS AND MANUFACTURES, 1790–1860

Forest resources, 315. Manufactures based on agricultural products, 317. Mineral resources and manufactures, 328. Chemicals and dyes, 333.

The stage of economic development of which political independence was a symptom manifested itself, among other ways, by the rapid exploration and occupation of the country's natural resources. Little change had occurred during the previous century in the character or origin of raw materials used by colonial manufacturers, but shortly after the Federal Government was established cotton-growing expanded from a garden occupation to a great commercial industry. Merino sheep were imported and began to supply the first fine wool produced in America, and the cultivation of hemp became a prominent industry in Kentucky. A new mineral resource was made available by the lead mines in Virginia and, after the Louisiana purchase, in Missouri; our first permanent and extensive salt manufactures grew up at the wells in New York and Virginia; relatively abundant supplies of saltpeter were discovered in the Kentucky caves; copperas began to be manufactured from Vermont and New Jersey pyrites; new and important iron areas were developed around Lake Champlain and along the tributaries of the Ohio; and domestic coal from Virginia and eastern Pennsylvania was experimentally employed in manufacturing. More intelligent development and closer exploration of the resources of older districts led to the discovery and utilization of better grades of materials than had been hitherto known to exist. Fine pottery clays made possible the improvement of domestic earthenware and some essays at the manufacture of porcelain, and the quality of glass made in America, so disparaged in the reports of colonial officials, now became equal to that of Europe.

FOREST RESOURCES

During the early part of the century no radical revolution took place in the exploitation of our forest wealth. Lumber continued to be a by-product of land clearing. Good timber was distributed as widely as the population and its manufacture was dispersed among numerous small sawmills, mostly run by water, little improved over their colonial predecessors and catering to local consumers. Where steam was used it facilitated rather than checked this dispersion, by making it possible to produce lumber for local needs in regions not hav-

ing water-power. As settlement extended inland and the people erected larger houses and furnished them better than the earlier settlers, the home demand for lumber increased, so that, relatively to the entire product of the country, foreign markets lost some of their importance.

Therefore, as a specialized industry, this manufacture was less dependent than previously on a tidewater outlet. The broader commercial market created by the growth of cities and by our general industrial development was supplied in part by rivulets of product that trickled into the reservoirs of interior shipping-points, and partly by the output of larger plants designed to meet this particular requirement. The latter mills, practicing economies of production and systematically exploiting the forest resources of regions not yet affording a local market, assisted the technical progress of the industry. Their location was suggested, however, by convenience of transportation rather than by the mere presence of merchantable timber of which there was everywhere a choice. During the first half of the century their home was the Appalachian highland, and their early seat was on the upper waters of streams that flow through New England, New York, and Pennsylvania to the Atlantic. The forests of the southern coastal plains also harbored a lumber industry of importance, though hardly responding to the promising development of sawmilling along the fall line of the Carolina rivers in the later eighteenth century. Some large establishments were erected on the Savannah River and tributary to Mobile and New Orleans. One of the first steam sawmills in the Union was situated on the lower Mississippi.[1]

Before the war commercial mills, designed to supply more than neighborhood demands, were in operation also throughout the Great Lakes Basin and the upper Mississippi Valley. The growing demand for building timber that accompanied the maturer development of the originally wooded regions of the West and the extension of settlement into the prairie States was supplied by the white pine forests of the North. Maine retained its prominence as a lumbering State in spite of longer settlement than its western rivals; and from its forests, as well as those of the Alleghenies, came the material for many ships during the supremacy of sailing-vessels. Meanwhile improved mills and diversified demands invited attention to the hardwood resources of the Central and Western States; and local oak, walnut, chestnut, ash, and hickory were utilized in large quantities by manufacturers of furniture, vehicles, farm implements, and machinery. Mahogany was the only timber extensively imported. In 1810, according to the census, Pennsylvania had 21 mills for sawing mahogany logs, their product constituting nearly 1 per cent in quantity and 3 per cent in value of the lumber output of the State.[2] Furniture manu-

[1] Howe, *Memoirs of American Mechanics*, 80 (note).
[2] *American State Papers, Finance*, II, 716.

facturers continued to import timber from the tropics for special uses, but never in large quantities or in substitution for local woods.

Pitch, tar, and turpentine, which in colonial times were produced in all the provinces, subsequently became the special product of North Carolina. This was due to the persistence in that State of conditions carried over from the previous century, rather than to its long-leafed pines, which were no better suited for the manufacture of these commodities than those forests further south which later have become a principal seat of their production. Lack of water-power in the coastal districts, the adaptation of slave labor to this crude form of manufacture, together with costly transportation, combined to make the production of naval stores more important than that of lumber in this region. Pot and pearl ash figured largely in our early commercial statistics, and for many years were a more important item of our foreign trade than naval stores.[3] Their manufacture was so dispersed, and so simply conducted, that it attracted little attention except in trade totals. Tanning continued to prosper because our oak and hemlock forests furnished bark abundantly; and so highly was this advantage appreciated by our leathermakers that in 1792 they petitioned Congress to prevent the exportation of this bark to England.[4] The importance of our forests to fuel-using industries was not lessened materially by the introduction of coal until the second quarter of the century.

MANUFACTURES BASED ON AGRICULTURAL PRODUCTS

Manufactures of grain exceeded in value of product those derived from any other raw material, whether produced within the country or imported. The geography of flour milling, like that of lumbering, has been affected by the exhaustion of neighboring raw materials, for under the wasteful methods of cultivation that have become traditional in America wheat lands rapidly lose their fertility. We have noticed already the decline of grain-farming in New England with the second and third generation of colonists, and the later substitution of wheat for tobacco in Virginia and Maryland. Before the adoption of the Constitution the increase of grain-farming in the latter States, especially following the settlement of the Shenandoah Valley and the tributary uplands of that river and the James, made mill centers of Richmond and Petersburg. This southern continuation of the grain region that during the previous century had extended from the Hudson to the Chesapeake made these seaboard States, until after 1850, the principal flour-producing section of the country.

The settlement of the Genesee Valley brought another wheat area under cultivation, which found its outlet in a group of mills at Roches-

[3] Pitkin, *Statistics of the United States*, 49.
[4] *American State Papers, Finance*, I, 151.

ter. Competition of the Ohio Valley and Great Lakes Basin with the millers of the East was postponed by costly transportation and by the diversion of up-river produce to the cotton plantations of the lower Mississippi Valley. In 1840 the coast States, from New York to Virginia inclusive, raised 47 per cent of the wheat and made 65 per cent of the flour produced in the country.[5] Ten years later they raised 46 per cent of the wheat and made 57 per cent of the flour reported by the census.[6] Ohio was the great inland grain and flour State, and with New York, Pennsylvania, and Virginia led the nation in this branch of industry. By 1860, though the Atlantic flour district had increased its production as much during the preceding decade as during the ten years ending with 1850, the proportion of the country's total product ground in its mills declined to 39 per cent.[7] Changes in the grain-raising areas had now transferred the center of this industry across the Alleghenies.

A conjunction of abundant grain with expensive transportation promoted whisky-distilling in the West, so that it was more important relatively to milling than on the seaboard. In 1850 Ohio led all the States in the manufacture of spirituous liquors, and the product of the Ohio Valley and Missouri was more than half that of the entire country. The surplus grain of the interior was used also for fattening stock, and thus indirectly forced the extension of meat-packing to the Ohio and central lake region. Here local conditions favored greater centralization and specialization of that business than on the Atlantic coast, partly because stock-feeding was associated with distilling,[8] but mainly because a capitalized industry served more economically the distant and dispersed markets to which inland producers must seek an outlet. Our manufacturers of tobacco before the war used principally domestic leaf, mainly from Virginia, Kentucky, Tennessee, Maryland, and North Carolina. In 1840 Virginia raised 34 per cent and manufactured 41 per cent of the country's product.[9] Louisiana was the only State that cultivated sugar-cane in quantities to support an important industry, though small plantations, mostly for making sirup, were scattered from Savannah to Texas.

Attention has been called previously to the fact that the colonies possessed no textile fibers in such quantities that their abundance formed a motive for manufacturing. This condition continued until 1800, and in respect to other materials than cotton remained unchanged during the succeeding century. Flax cultivation declined without ever having attained commercial proportions; hemp continued to be imported; silk never was produced in marketable quantities, and, as we

[5] U. S. Census 1840, *Compendium*, 364.
[6] U. S. Census 1850, *Abstract of Manufactures*, in *Sen. Ex. Doc.* 39, 35th Cong., 2d sess., p. 51.
[7] Compiled from U. S. Census 1860, *Manufactures*.
[8] *Hunt's Merchants' Magazine*, xxxvi, 383, Mar. 1857; Krafft, *American Distiller*, 32.
[9] U. S. Census 1840 *Compendium*, 359, 362.

have seen, even our infant manufactures outgrew the domestic supply of wool. Partly compensating this, in the influence which such conditions have upon international competition, was the growing dissociation of textile industries, in all parts of the world, from local raw materials, so that in this respect the United States stood at a less serious disadvantage as compared with its transatlantic competitors.

The pioneer manufacturers of New England used almost exclusively West Indian and South American cotton. Southern cotton was at first so poorly picked and assorted that it was employed only for hand-spinning. Moses Brown wrote of it, in 1791:

> "The unripe, short, and dusty part being so enveloped with that which would be good, if separated properly at first, so spoils the whole as to discourage the use of it in the machines, and obliges the manufacturer to have his supply from the West Indies under the discouragement of the impost."[10]

The last reference is to the duty of 3 cents a pound imposed the previous year, as other costs from West Indian and southern ports respectively were about equal.[11] The displacement of Cayenne, Surinam, and Pernambuco cotton by that from the South was gradual. Until 1813 No. 16 yarn could not be spun by our operatives, on the machines then in use, from upland cotton. Consequently it was necessary to mix this with Pernambuco cotton, and occasionally with a bale of long staple from South Carolina.[12] However, from the first the prospect of a domestic supply of raw materials encouraged our manufacturers, and supported the sentiment in favor of protecting their industry on which they relied for success. The immediate competitive advantage American mill-owners derived from home supplies was moderate. Cotton freights from New Orleans to New England and Old England ports, during the early part of the century, were 1 cent and 1 penny a pound respectively, a difference of about a cent a pound in favor of domestic manufacturers.[13] This was a smaller percentage of the cost of cotton, and cotton was a smaller percentage of the cost of yarn and cloth than at present. Such advantage as lower freight gave our mill-owners was at times overbalanced by more favorable exchange between southern ports and London than between the same ports and Boston or New York.[14] On the other hand, even if all alike had con-

[10] Letter of July 22, 1791, *Hamilton Papers, Library of Congress.*

[11] *Cf.* McLane, *Report on Manufactures,* II, 846–847.

[12] McLane, *Report on Manufactures,* I, 173.

[13] *E.g., New York Commercial List,* quoting *New Orleans Prices Current,* June 28, 1818; also *New Orleans Prices Current,* Aug. 17, 1825; *cf.* also *Parliamentary Papers,* 1833, VI, 51 (questions 827–830).

[14] London's advantage of exchange over New York or Boston, in the New Orleans market, between 1823 and 1827, was usually from 3 to 4 per cent; *New Orleans Prices Current,* Oct. 4, 1823; Jan. 3, 1824; April 3, 1824, etc.; *cf.* quotations for New Orleans exchange upon different cities May 12 and Dec. 18, 1816, in *New York Shipping and Commercial List,* and also Holmes, *Account of the United States of America,* 216. For exceptional exchange conditions, see G. W. Daniels, "Cotton Trade under the Embargo," in *The American Historical Review,* XXI, 283, Jan. 1916.

tinued to use foreign cotton, our manufactures would have been at little disadvantage compared with their transatlantic rivals. British factories, at least occasionally, received East India cotton via America.[15] Other foreign cotton constantly passed through American warehouses in transit to Europe, mostly from Mexico and the West Indies. Between 1820 and 1850 this commerce increased from 300,000 pounds to 4,350,000 pounds per annum;[16] thereafter it nominally declined, because the annexation of Texas transferred over 1,000,000 pounds of foreign cotton to the domestic crop. Part of this imported cotton was diverted to American factories. Before 1830 the quantity thus used annually was about 80,000 pounds, but it increased to over 1,300,000 pounds before the Mexican War, when we were spinning the Texas cotton just mentioned. A decline to about 800,000 pounds a year followed that event. Most of this cotton was long-staple and other special fiber from the West Indies, required by the finer and more varied manufactures now becoming established in America. Egypt did not contribute to this supply.

Though cotton manufacturing was undertaken early in the South, the enormous growth in the demand for raw cotton continued to center the whole productive energy of that section in agriculture. It was not till nearly the middle of the century, when the development of new planting areas was absorbing relatively less of the capital and labor of the Southern States, that mills began to get a real foothold in the vicinity of the cotton fields. However, the facility with which upland cotton from Tennessee and northern Alabama reached the Ohio Valley by river highways caused its manufacture to be established much earlier than this at various points between Pittsburgh and St. Louis.

Wool stands in contrast to cotton as a raw material, in that we early developed in this country all the grades of cotton fiber required by our manufacturers, while domestic wools have always been limited in assortment if not in quantity. We have produced cotton about as cheaply as any country; but our wools generally have cost more than those of equal quality from abroad. Sheep-raising in the colonies appears not to have been particularly profitable or popular. Had Great Britain permitted the colonists to import medium and coarse grades of wool from the Mediterranean countries with which they traded lumber and provisions, less wine and less mutton might have been consumed on colonial tables; and when the break with the mother country came, even greater difficulty than actually was experienced might have been encountered in clothing both citizens and soldiers. In 1791 the Secretary of the Treasury was informed that in New England sheep raising was unpopular because—

[15] Great Britain, *Parliamentary Papers*. For comparative American and British prices of cotton and pig-iron, see Appendix IX, Table 1 and chart.

[16] *Commerce and Navigation Reports*, 1820–1850.

"In the first place sheep are apt to be unruly and troublesome, and in the next place they will not pay the expense of keeping equal to other stock. * * * It is a well known fact that the wool that is shorn from the sheep is no compensation to the farmer for keeping them."[17]

At the same time the manager of the Hartford woolen mills reported, without details, that domestic wool was scarce and the price high, and that it was necessary to buy a year's stock for the factory at the time of the shearing, in order to be assured of a supply. He added:

"This evil we endeavored to remedy by contracting for Spanish wool; but we were so imposed upon by the merchants in the quality of the wool that we have been deterred from recurring to this expedient again."[18]

This mill employed some southern wool, which was used occasionally later by northern manufacturers, who received it indirectly in exchange for negro cloth;[19] and pulled wool from Iceland was imported, about this time and subsequently, for making the same grade of fabrics.[20]

In some parts of New England the amount of wool raised was estimated at 25 pounds a family per annum.[21] The wool production of each farm was roughly adjusted to the demands of household consumption, and little of the shearing reached a commercial market. Therefore, early woolen mills could exist only by supplementing or displacing homespun manufactures sufficiently to produce a surplus of domestic wool; and their range of products was limited to the fabrics which the wool used in homespuns was suitable to make. This double limitation of raw materials determined the utmost expansion of American woolen manufactures until the introduction of Merino sheep.[22]

The latter event occurred in 1801, but the new breed did not begin to influence the wool-supply until the period of embargo and non-intercourse. During the eight years from 1807 to 1815 the high price of woolen goods in America reacted on the price of wool and gave as great an impetus to wool-growing as to manufacturing. Several early mills acquired large sheep-farms and produced directly an important part of the material they used. Flocks increased rapidly, especially in northern New England, New York, and Ohio, and the spread of Merino blood, through importation, breeding, and cross-breeding, diversified permanently the quality of American wool. The last tendency

[17] Letter of William Hillhouse, Montville, Connecticut, Sept. 6, 1791, *Hamilton Papers*, Library of Congress.

[18] Letter of Elisha Colt, Aug. 20, 1791, *Hamilton Papers*, Library of Congress. Spanish or Portuguese fine wool was used, however, by later manufacturers; Dickinson, *A Geographical and Statistical View of Massachusetts Proper*, 64.

[19] Wansey, *Excursion to the United States*, Appendix II, 261; Hazard, *Manuscript Letter Book*, letters to R. King, Mar. 17, Sept. 10, 1831, and to William Ravenel, Mar. 8, 1832.

[20] Almy and Brown, *Manuscript Letter Book*, letter to George Booth, Poughkeepsie, Mar. 26, 1810.

[21] Letter of Alexander King, Suffield, Connecticut, Sept. 12, 1791, *Hamilton Papers*, Library of Congress.

[22] *Cf.*, however, Custis, *Address to the People of the United States*, or Livingston, *Essay on Sheep*, 153–155.

was assisted by the later introduction, from Saxony and elsewhere, of other fine wool sheep. After the War of 1812 local producers were able to supply carding wool for all grades of fabric, from homespun substitutes to the finest goods used in the country; but no long combing wool, such as was required for worsteds, was raised within our boundaries. Moreover, American farmers had no inducement to raise coarse, cheap wool, of the grades produced abundantly on the Argentine pampas and around the eastern borders of the Mediterranean. The latter was in demand for making carpets and for manufacturing the coarse negro cloths used for clothing slaves.

After 1815 it was possible to maintain in the United States a diversified cotton and woolen industry employing only domestic raw materials.[23] If woolen factories went abroad for part of their supplies, this was because peculiar market conditions and the course of trade justified their doing so. In respect to raw materials commerce resembles a natural resource. The cheapest grades of foreign wool were naturally abundant in our markets, because South American ranchers bought our produce and trading goods with salt hides and coarse fleeces, and the Mediterranean countries bought our lumber, rum, flour, and provisions with both coarse and fine wool, as they had begun to do two hundred years earlier, before Great Britain interposed the barrier of her navigation acts across the pathway of this commerce.

But though diversified manufactures might have been maintained solely by domestic wool, imported materials in fact determined the development of this industry. After 1820 both sources of supply supplemented each other. At first manufacturers sought abroad two extremes of quality, the finest and the coarsest grades; but after the introduction of Saxony sheep, between 1822 and 1830, and the further improvement and increase of Merino and mixed breeds in this country, only the cheapest wool needed to be imported.

From 1815 until 1840 the principal wool-growing areas of the Union were the New England and Middle Atlantic States, especially Vermont, the Berkshire district of Massachusetts, New York, and western Pennsylvania. Eastern Ohio, likewise, had large flocks.[24] Throughout this country Merino and Saxony sheep supplied most of the commercial clip. These fine wools were adapted to making broadcloth, which was then the élite product of American mills. Closer to the sea, from Delaware to Rhode Island and the two-century-old grazing lands of the Massachusetts coast islands and peninsulas, descendants of English mutton breeds produced a coarser wool, that in colonial days had been combed for serges and stocking yarns and now found a sale at small flannel and satinet mills making goods for local and southern markets. As late

[23] *American State Papers, Commerce and Navigation*, II, 612.

[24] Salmon, *Sheep Industry of the United States*, Wright, *Wool Growing and the Tariff*, 60–67, 87–91.

as 1840, 60 per cent of the sheep in the country were in the North Atlantic States. Until that time eastern mills depended for domestic wool mainly upon neighborhood sources, though since 1825 occasional lots had come through from Ohio.[25] Convenience of access to domestic as well as to imported raw materials, therefore assisted other causes in determining the location of woolen manufactures in the same region.

Between 1840 and 1860 the center of American wool-growing moved to the West.[26] During the early forties low prices for grain and provisions and high cost of transportation turned the attention of farmers in the Ohio and the upper Mississippi valley to sheep-raising, while in the East dairying began to prove more profitable than the older industry. The number of sheep in the East declined not only relatively, but absolutely. However, within market range of our growing industrial and commercial cities, which now began to play a larger part than heretofore in the productive and distributive economy of the country, more sheep than formerly were raised for mutton. This turned attention in those localities to English breeds, which produced longer and coarser wool than the Merino sheep that had displaced the temporarily popular Saxons and continued dominant in western pastures.[27] Meanwhile another center for long-wooled mutton breeds grew up in Kentucky and Tennessee, especially in the bluegrass country, which peculiarly suited these varieties.[28]

From 1815 to 1830 the production of domestic wool is supposed to have increased but moderately.[29] However, at the former date the industry had been overstimulated by the war with England, while at the latter it was on a very conservative basis. During the next few years home production did not keep pace with the demands of manufacturers, and mill-owners not only scoured the country for wool but sent agents to Europe to buy it in British and Continental markets.[30] After 1840, when the West, which had supplied wool for its local manufactures, both household and commercial, for more than a quarter of a century, began to ship that commodity freely to the East, we for a time produced a surplus of fine and medium grades, and exported more of these than we bought abroad.[31] But this condition was only temporary though it led to extravagant hopes that America might in time supply the world with this fiber as it did with cotton.[32]

Trade convenience had determined our first importations of foreign

[25] *Cf.*, however *Niles' Register*, XXIX, 166, Nov. 12, 1825; Hazard, *Register of Pennsylvania*, I, 141, Mar. 1, 1828.

[26] Wright, *Wool Growing and the Tariff*, 117, 135.

[27] Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1852, 71, 73.

[28] Salmon, *Sheep Industry of the United States*, 658.

[29] Wright, *Wool Growing and the Tariff*, 63, 69, 75.

[30] The shortage was acute soon after 1824; George W. Bond, in *Report on Wool and Manufactures of Wool, in House Misc. Doc.* 550, 50th Cong., 1st sess., lviii.

[31] *Cf. New York Shipping List*, Dec. 12, 1846; Wright, *Wool Growing and the Tariff*, 139, 140, 145, 146.

[32] *Niles' Register* LXVI, 387, Aug. 10, 1844; Wright, *Wool Growing and the Tariff*, 153, 154.

wool. After this commerce was established, it was found that European wool was more carefully sorted and graded than American. Importing merchants also gave longer credit than farmers and local buyers to manufacturers.[33] But other considerations were mainly responsible for the use of foreign materials. We practically freed ourselves from dependence on Europe for fine wool in 1830; after that most of our imports came from the Levant and from South America, usually by direct routes, but to some extent via Europe. The quality of fiber thus obtained suited the manufactures most favored by markets and by technical conditions in America. The South and the frontier demanded coarse fabrics; and these only could displace the homespuns which were the main competitors of our factory products. Cotton was abundant and cheap, and wool that mixed well with this, at first for satinets and later for fancy cloths and worsteds, was in demand. Machinery was invented that enabled Argentine wool, which came to our market clogged with burs and dirt, to be cleaned and sorted with less expense than formerly.[34] Other improvements, especially in looms made it possible to produce fancy cloths of cheaper materials than the broadcloths which their attractiveness and novelty caused them to displace. Soon after 1840 the manufacture of worsteds, which had been in abeyance since colonial times, was resumed. This was due to encouragement afforded by the duties on this article, restored in 1842 and 1846, by the successful introduction of combing machinery, and by the larger production of suitable wool in America and its free importation, under a reciprocity treaty, from Canada.[35]

The ratio of imported to home-grown wool used at different periods by our industries is known only approximately, because we lack accurate statistics of home production. Our manufacturers employed some wool from Spain during the last war with England,[36] but the depression of industry between 1815 and 1820 caused us to export more wool than we imported. After 1820 practically all the domestic clip was manufactured within the country, yet our dependence on foreign wool increased. We shall not err widely in stating that between 1820 and 1830 our factories and household industry used 1 pound of imported wool for every 16 pounds of domestic origin; that during the next decade this proportion changed to 1 pound in 7; that from 1840 to 1850 it approached 1 pound in 4; and that after 1850, in spite of unfavorable tariff conditions, almost one-third of the wool used by our manufacturers was from foreign sources. Such causes as improvements of machinery and changing fashions, closer commercial relations with other countries, the transformation of American farm economy, and particularly the decline of household manufactures, all participated in favoring this tendency. But this change was not peculiar to the

[33] Wright, *Wool Growing and the Tariff*, 65.
[34] See 422, *f.*
[35] See 423–424, *f.*
[36] Wright, *Wool Growing and the Tariff*, 30 (note).

United States. Great Britain, with a more developed industry, experienced it earlier than we did, and Germany and her Continental neighbors somewhat later. During the latter part of this period, at least, a decline in the quantity of wool produced in proportion to the population occurred in most industrial nations. According to census estimates, between 1850 and 1860 the amount of wool raised in the United States decreased from 2.26 to 1.92 pounds per capita,[37] although that was the decade when the Pacific Coast—as yet almost a foreign country in its economic relations with the rest of the Union—first became prominent as a producer of this commodity.

Until 1810 the manufacture of flax was the best established and most widely distributed textile industry in the country; and though it was confined mainly to the household, even at that time it depended in part on imported materials. The quantity of these early imports is not recorded, as until 1828 flax was classified with other unenumerated commodities in tariff laws, and consequently in customs returns. Our commercial manufactures were limited in extent and variety and, like those of hemp, were mostly for the supply of shipping. They were successful only so far as they could procure cheaply the superior water-retted flax of Ireland and Poland. In 1827 a single duck factory at Paterson, probably the largest in the country, used 382,478 pounds of imported flax.[38] Five years later its consumption had increased to 600,000 pounds, but some of native growth was used, probably for cotton bagging.[39] At this time our imports averaged about 436,000 pounds per annum.[40]

Statistics of domestic production do not begin until 1850, when the cultivation of flax was rapidly declining. According to the census the total amount raised in the country decreased between 1850 and 1860 from 7,710,000 to 4,720,000 pounds. Compared with the population this product was almost negligible, even at the former date hardly exceeding 5 ounces per capita.[41] Meanwhile, as in case of wool, both the absolute and the relative quantity of foreign flax manufactured in America was increasing. Between 1843 and 1850 our annual imports already averaged over 900,000 pounds; and during the following decade they increased to about 2,500,000 pounds.[42] In other words, within less than twenty years the amount of imported flax used in the country rose from one-ninth to one-third of our total consumption. This was in face of the higher duties imposed in 1846. As in the case of wool the transition from household to factory manufactures had

[37] U. S. Census 1860, *Agriculture*, lxxxix. Our wool consumption was estimated at 2.66 pounds per capita in 1860; *id.*, *Manufactures*, xxii.

[38] *American State Papers, Finance*, v, 834. Other manufacturers also used imported flax: *cf. id.*, 1038.

[39] McLane, *Report on Manufactures*, II, 141.

[40] *Commerce and Navigation Reports*, 1828–1833.

[41] U. S. Census 1860, *Agriculture*, lxxxix, xci.

[42] *Commerce and Navigation Reports*, 1843–1860.

much to do with this result. The labor cost of preparing flax for market was greater than of any other textile fiber except silk, and was a peculiar disadvantage in America, where wages were higher than in other industrial countries. Evidently absence of raw materials, which in Europe were to be had in the vicinity of factories, was alone sufficient to explain the limited development of our linen manufactures.

Although in colonial days the British Government paid bounties on American hemp, our rope-walks, as previously observed, even then used imported materials. Neither Federal duties nor the conditions of non-intercourse were at first more successful than these earlier bounties in freeing the country from foreign dependence for this commodity. Our imports slowly rose from about 3,400 tons a year before 1800, to 4,200 tons during the second war with England, and to a maximum of nearly 5,000 tons between 1820 and 1840.[43] Thereafter they rapidly declined to 2,300 tons the following decade, and after 1850 to less than 1,900 tons. Meanwhile domestic production was increasing. In 1810 Kentucky reported a crop of 5,755 tons[44] and in 1840, according to defective census figures, it raised less than 10,000 tons of hemp and flax combined, but in 1850 that State produced nearly 18,000 tons of hemp alone, and in 1860 more than 39,000 tons.[45] Cultivation was extending in the country as a whole, for between 1850 and 1860 the amount reported rose from 34,871 to 74,493 tons. Moreover, while in 1850 practically all the crop was dew-retted, and therefore of relatively inferior quality, nearly one-third of that produced in 1860 was prepared by improved processes.[46] Consequently our hemp supplies followed a trend contrary to that of wool and flax. With the lapse of time we became more independent of foreign sources. This material never was used extensively in household industry—a fact that probably explains the different course taken by its production.

The early endeavors to raise silk in Georgia and South Carolina bore no permanent fruit, and except for a doubtful entry of 103 pounds from Massachusetts this article does not appear in the census of 1810. Thereafter official statistics of domestic production are a blank until 1840, when 61,522 pounds of cocoons were reported. Over one-fourth of these were raised in Connecticut. In 1850 and 1860 between 10,000 and 12,000 pounds were returned by the census; but in the meantime silk manufactures using imported materials were increasing. Prior to 1840 our annual purchases of raw silk abroad averaged about $10,000; during the next decade they rose to nearly $200,000, and after 1850 to $575,000. Therefore this industry received no encouragement from

[43] Seybert, *Statistical Annals*, 160–163, 257, 258; *Commerce and Navigation Reports*, 1821–1860.
[44] *American State Papers, Finance*, II, 672.
[45] U. S. Census 1840, *Compendium*, 358; DeBow, *Statistical View of the United States* (U. S. Census 1850, *Compendium*), 173; U. S. Census 1860, *Agriculture*, 187.
[46] As early as 1730, Pennsylvania enforced the use of water-retted hemp for cordage; Pennsylvania, *Statutes at Large*, IV, 184.

native materials. Its supplies were imported from China and Europe, partly via Great Britain. This remoteness of supply was a less serious disadvantage than it would have been in most other branches of manufacture, because raw silk has small bulk in proportion to its value, but the industry owed its growth to legislative favor and individual enterprise rather than to natural conditions.

Although American farms and ranges carried more live-stock than the country consumed, they did not produce enough hides and tallow for our tanners and candle-makers. South America and the West Indies supplied us with these commodities, as they had prior to independence. Between 1820 and 1860 our annual net imports of untanned hides rose in value from $1,736,000 to nearly $8,000,000. Before the War of 1812, American candle-makers and soap-makers used 600,000 pounds of foreign tallow a year. This amount rose to 1,100,000 pounds between 1820 and 1830, but thereafter rapidly declined. When our imports were largest they came principally from Russia. The same country also supplied our brush-makers with bristles. Our foreign purchases of these rose from an annual average of 100,000 pounds between 1820 and 1830 to nearly 500,000 pounds during the ten years ending with 1860.[47]

It therefore appears that products of agriculture did not of themselves control the development of our manufactures. Not a single textile industry was founded because of abundant domestic materials. The subsequent extension of cotton-planting favored our factories, though it probably influenced them less, as distinct from its effect upon those of every country, than is generally supposed. Animal industries, as we have just seen, were not adequate to the demands of manufacturing consumers. An exception should perhaps be made of the preparation of salt provisions, which, like flour-milling, whisky-distilling, and tobacco-pressing, was less a reproductive than a marketing industry.

Whale oil and tallow were the most important illuminants used in the United States up to the Civil War. Our imports of the former increased until the decade ending with 1840, when their annual average, in addition to the catch of our own whalers, exceeded 3,000,000 gallons. Nine-tenths of this was sperm oil, from which candles were manufactured for both home and foreign markets. After 1840 we shipped abroad more whale products than we received. Industrial uses were found for whalebone, which added to the profit of the fishery; and between 1835 and 1850 this business was very prosperous.[48]

[47] Compiled from Seybert, *Statistical Annals*, and *Commerce and Navigation Reports*.
[48] Tower, *History of American Whale Fishery*, 50.

MINERAL RESOURCES AND MANUFACTURES

Until 1850 iron and lead were practically the only industrial metals commercially produced within the United States. Some copper was mined in the Lake Superior region shortly before the Civil War, but not sufficient to supply the country. About the same time zinc was discovered in Pennsylvania, New Jersey and Wisconsin. However, it is an important fact affecting our industrial development for the first seventy years of national existence, that during this period no one of our mineral resources supplied adequately the demands of domestic manufacturers. We continued to depend on Europe and South America for such materials. This condition determined the localization of our metal-using industries and limited their extension.

So long as charcoal alone was used for smelting, or until about 1840, both ore and forests were so widely distributed in America that the localization and extent of iron-making were not determined primarily by the presence of raw materials. The quantity of iron produced varied widely and erratically in response to commercial conditions. Between 1810 and 1820 the output of American furnaces is supposed to have fallen from 54,000 to 20,000 tons. It then increased, probably with unrecorded temporary interruptions, to about 165,000 tons in 1830, and to double that amount ten years later. Within two years after 1840 an era of low prices caused production to decline to 230,000 tons, but a speedy recovery brought it up to 800,000 tons towards the end of the decade. When the census of 1850 was taken another reaction had cut the nation's product to 563,000 tons. Towards the end of 1852 an even lower point, probably not exceeding 500,000 tons, was reached. Thereafter a quick turn in the tide of prosperity, shortly before the panic of 1857, caused production to equal 800,000 tons. In 1860 the census reported 988,000 tons of pigs and 51,000 tons of blooms produced in the country.[49]

Bog ores, which had played an important part in colonial iron history, were exhausted or ceased to be utilized. The rock ores of western New England and northern New Jersey, which likewise had supported colonial furnaces and forges, continued during this period to maintain an active industry, though one declining in relation to newer fields. Lake Champlain gave its name to a third and newer iron area, where ore was reduced mostly in bloomeries. But already, before 1860, the competition of foreign iron and the gradual exhaustion of fuel were affecting the prosperity of all these districts. By the middle of the century it was evident that the relation of coal fields to ore beds was

[49] Stanwood, *American Tariff Controversies*, I, 172; Bishop, *History of American Manufactures* II, 259–260; Swank, *Iron in All Ages*, 510; A. S. Hewitt, in *DeBow's Review*, XXII, 50–51, Jan. 1857, also published separately as *Statistics and Geography of Iron*, 24; *Documents Relating to the Manufacture of Iron*, 88; French, *Iron Trade of the United States*, 179, and different figures in Lesley, *Iron Manufacturer's Guide*, 760; U. S. Census 1860, *Manufactures*, clxxviii.

to control the future geography of iron-making. Around the anthracite mines of eastern Pennsylvania, using the primitive and the brown hematite ores that still supplied 103 charcoal furnaces in their vicinity, had grown up a group of nearly 100 larger anthracite furnaces, which in 1860 made this the principal iron region of the Union. But the soft coal and carbonaceous ore districts of western Pennsylvania, Ohio, and the central Ohio Valley, formed a rival center already threatening the supremacy of its eastern competitor. Between 1850 and 1860, when the first Lake Superior ores reached Pennsylvania and Ohio, the iron industry of America was getting effective command of its resources, and for the first time the abundance and the advantageous location of raw materials began to have their full effect on its development.[50]

This is evidenced by a decline in the relative amount of iron imported as compared with the domestic output during the decade just mentioned. Although within fifty years the home production of iron had increased twenty-fold and the population had grown but little more than four-fold, the proportion of foreign iron used by our manufacturers had remained nearly constant. It may have been higher than at any other time during the depression of 1820, but from that date until 1850 Europe furnished about one-fifth of our supply. In 1855 a careful estimate placed the per capita consumption of iron in the United States at 117 pounds, of which 33 pounds were supposed to be imported;[51] but this included manufactured and railway iron, and the proportion of foreign pigs and bars consumed in the country was falling off; by 1860 the latter constituted but 15 per cent of those used by our ironworkers.[52]

Most of the lead mined in the United States before the Civil War came from the upper Mississippi field, of which Galena was the center. These ores were non-argentiferous, and association with silver was not yet a factor in production. Although the Galena mines contributed an important fraction of the world's lead supply, and even before the War of 1812 small quantities were exported from this region, domestic sources were for many years inadequate to the demands of the country. Between 1801 and 1810 our annual importation of manufactured and unmanufactured lead, exclusive of colors, averaged 2,500,000 pounds.[53] Thereafter home production about kept pace with the increase of consumption, for between 1820 and 1840 our imports of pigs and bars, which constituted most of our foreign purchases, amounted to 2,600,000 pounds per annum. For the next ten years the country more than supplied its own requirements, so that we exported yearly 1,000,000

[50] See 498–499, *f.;* Williams, *The Honorable Peter White*, 11, 17, 49, 67.

[51] Hewitt, *Statistics and Geography of Iron*, 13; *cf.*, however, *Documents Relating to hte Manufacture of Iron*, 2.

[52] Compiled from U. S. Census 1860, *Manufactures*, clxviii, and *Commerce and Navigation Reports*, 1860, 27, 101, 105, 227, 229.

[53] Seybert, *Statistical Annals*, 166, 167, 170, 171.

pounds more than we imported.[54] The maximum output of the Galena district was in 1845, when it reached 54,495,000 pounds and the average price was under 3 cents a pound. Ten years later production had fallen to 30,000,000 pounds and prices had doubled.[55] It resulted that our net imports of lead between 1850 and 1860 exceeded 45,500,000 pounds per annum, and during some years they were greater than the maximum amount ever mined within the country.[56]

Lead-using manufactures arose at St. Louis, on the water route from the mines to New Orleans, and were founded at Chicago after railway communication was established. But the vicinity of raw materials was not so important as the presence of markets in determining the localization of this industry. During the ten years of large production ending with 1853 the average product of the Galena mines was 42,000,000 pounds a year, of which nearly 35,000,000 passed through New Orleans, mostly to northern ports.[57] During this period our foreign exports averaged 5,777,000 pounds; consequently the greater part of our river lead was used by manufactures situated between Baltimore and Boston. Imported lead usually determined prices, and so long as the only practicable transportation was by water, Spanish mines were almost as accessible to our industrial States as those of Illinois. Therefore the principal influence of domestic materials was to serve the convenience of western settlements and to foster in the river cities such manufactures of this material as local markets could support.

Copper ranked next to iron in industrial importance and our average annual imports of its manufactured forms nearly quadrupled between 1830 and 1860. They constituted one of the motives of our trade with the western coast of South America. Cuba also became later a source of supply.[58] Therefore, raw materials from mines important enough to affect world prices and to meet home requirements were as accessible to American manufacturers as to those of Europe. But until after 1850 Great Britain was the principal producer of this metal, and her smelters employed not only local ores but those from Cuba and Chile. England therefore controlled the world's copper market and was the chief source from which we imported its partly manufactured forms. Before 1860 Michigan was producing nearly half as much copper as Great Britain, but this development came too late to affect materially the course of our manufactures before the Civil War.[58]

Our imports of tin and tin-plates likewise came from England, and exceeded in value those of any other metal except iron and steel. They rose from less than $500,000 a year, between 1820 and 1830, to nearly $5,000,000 a year four decades later. Most of the alloys we used, such as brass and pewter, also were British, though we employed them in

[54] *Commerce and Navigation Reports.*
[55] *Cyclopedia of Commerce,* II, 1193.
[56] *Commerce and Navigation Reports,* 1850–1860.
[57] *Cyclopedia of Commerce,* II, 1193.
[58] *Mineral Industry,* IV, 272–274; I, 107–108.

reproductive manufactures that found a market even in the country of their origin.

Scarcity of wood began so seriously to embarrass fuel-using manufacturers near our eastern cities early in the century that the permanence of their enterprises in those localities was threatened by this difficulty. Soft coal had been discovered near Richmond about 1750, and mines in that vicinity were producing regularly at the time the Constitution was adopted.[59] In 1796 a French traveler described those at Dover as employing 500 negroes, in workings already 120 feet deep. South of the James were still larger undertakings.[60] Virginia coal was distributed along the coast from Baltimore to Boston, and for many years supplied most of our home consumption. Statistics of early production are scanty, but by 1820 the annual output is supposed to have approached 50,000 tons. The Chesterfield district reached its maximum productivity about 1833;[61] but in 1840, when 380,000 tons of coal were mined within its borders, Virginia still ranked next to Pennsylvania in this industry.[62] For a time the importance of its mines was increased by the fact that they produced the only domestic coal accessible to the coast which consumers knew how to use. Soft coal was mined in the West, but could not be conveyed to the seaboard. Hard coal was mined in Pennsylvania, within reach of markets, but it was not successfully employed in industry. We always had received some coal from England, the average amount before 1800 being 8,000 tons per annum.[63] Imports were about 14,000 tons a year between that date and 1820,[64] when increasing demands made them rise to an average of 35,000 tons for the following decade. Soon after this Nova Scotia producers entered our northern markets, and between 1850 and 1860 our consumption of foreign coal reached 235,000 tons a year.[65]

The discovery of anthracite dates back to the colonists, but its use for manufacturing did not begin until the War of 1812, when the British blockade of the Chesapeake cut off Philadelphia from Virginia coal. So great was the scarcity that prices in that city rose to $1.20 a bushel.[66] Country blacksmiths, in the neighborhood of the mines, had been using Lehigh anthracite for several years, and probably this suggestion, combined with lack of other fuel, prompted a rolling mill near Philadelphia and a neighboring firm of wire-drawers to try that coal at their establishments.[67] Though these experiments were success-

[59] *Congressional Register*, I, 97.
[60] La Rochefaucault, *Travels in North America*, II, 63.
[61] Bishop, *History of American Manufactures*, II, 275.
[62] U. S. Census 1840, *Compendium*, 359.
[63] Seybert, *Statistical Annals*, 160–163.
[64] *Sen. Doc.* 71, 62d Cong., 1st sess., 136.
[65] *Commerce and Navigation Reports*, 1850–1860.
[66] Joseph Herzog, *Manuscript Letter Book*, May 1, 1813.
[67] Bishop, *History of American Manufactures*, II, 117, 185; U. S. Census 1860, *Manufactures*, clxx; Swank, *Iron in All Ages*, 475, 476; *Minutes of Evidence, Orders of Council*, 446, 452, in Great Britain, *Parliamentary Papers*, 1812, III.

ful, its introduction was slow, and it was not generally employed until after 1820, the year that marks the beginning of the great expansion of coal-mining in this country.

Increasing scarcity of wood, the growing household market created by a multiplying population, improvements in grates and furnaces, better industrial technique, and the employment of steam motors for manufacturing and transportation, coöperated about 1820 to create a greater demand for coal than previously had existed. Soon after 1830 the smelting industry added its requirements to this new call for fuel. As a consequence, during the next forty years coal rose from a subordinate position in the industrial economy of the nation to one of prime importance. Fortunately our natural resources responded to this need, and domestic production kept pace with the demands of the country. In 1820 we are supposed to have mined less than 50,000 tons; in 1860 the output was 14,334,000 tons.[68]

The defective manufacturing census of 1820 records the fact that Virginia, or "sea" coal, was employed with charcoal at several New England forges for making iron bars, anchors, and farm implements, and at engine-works in New York City. A foundry and machine-shop at Cincinnati used 40,000 bushels of "stone coal" and only 4,000 bushels of charcoal.[69] Three years later anthracite was employed at rolling mills in Boston.[70] By 1831 the use of Virginia and Maryland "sea coal" was extending to country blacksmith shops as far north as Maine.[71] In larger New England plants hard and soft coal were taking the place occupied by soft coal and charcoal a few years before. The Boston glass works reported, among raw materials consumed, 700 tons of Virginia soft coal and 100 tons of Pennsylvania anthracite.[72] Calico-printers and dyers were substituting coal for wood.[72] By 1831 two-thirds of the 90 or more steam-engines in Philadelphia were coal-burning, and in 1835 coal-dust briquettes, possibly from neighboring lignite mines, fired the boilers of a Rhode Island silk mill.[73] During this decade anthracite was successfully used to smelt iron ore. In 1837 coal was employed with charcoal in four of the five furnaces in Greenup County, Kentucky.[74] Throughout the country generally our resources of this material, by virtue of their abundance and their location convenient to water transportation, prevented scarcity of fuel from checking the growth of manufactures. The use of coal was hampered by no obstacle but the temporary immaturity of our industries, and the extent of its employment measures, perhaps more accurately than that of any other product, the progress of our manufacturing development.

[68] U. S. Census 1860, *Manufactures*, clxiii.
[69] *American State Papers, Finance*, IV, 39, 40, 41, 89, 196.
[70] *Cf.* also, for cotton mills, *Niles' Register*, XXXIII, 157, Nov. 3, 1827.
[71] McLane, *Report on Manufactures*, I, 38.
[72] McLane, *Report on Manufactures*, I, 122; 162.
[73] *Niles' Register*, XL, 344, July 16, 1831; Hazard, *Register of Pennsylvania*, XVI, 348, Nov. 28, 1835.
[74] Kentucky Board of Internal Improvements, *Report of 1837*, 145–146.

CHEMICALS AND DYES

Most of the raw materials of industrial importance that may be roughly grouped as chemicals were employed in dyeing. Sulphur and saltpeter were exceptions. Many of these were produced in the country, but not in quantities to supply the domestic market. Others were refined from imported materials and partly reëxported. So it happens occasionally that the value of that part which was shipped out of the country exceeded the value of all the material imported. Indigo was the most important dye employed in manufacturing. It had been raised in South Carolina during the previous century, some of the finest in the world coming from that colony, but since cotton became profitable its cultivation had ceased. Our annual purchases abroad, which began with our foreign commerce, rose from $500,000 per annum between 1820 and 1830 to nearly $1,000,000 before 1860. Until after 1840 our net imports of other vegetable dyes were negligible and their aggregate value never reached one-fifth that of indigo. Alum and copperas were made at home, so that we were practically independent of foreign sources for them; but barilla, or soda ash, used by dyers and by makers of soap and glass, came mostly from abroad. Between 1825 and 1860 our annual purchases of this article rose from about $70,000 to four times that amount. Though saltpeter was manufactured in Kentucky and Missouri, it was more largely refined in America from foreign materials.[75] Before 1850 our imports were valued at about $225,000 per annum, but they increased fourfold during the next decade. For sulphur—like saltpeter, mostly used for making gunpowder—we were wholly dependent on other countries.

Evidently native raw materials did not exercise a controlling influence over our manufacturing development before the Civil War. Some industries founded on local resources owed their existence chiefly to difficulties of transportation, that prevented outside competition and retarded the rise of more profitable employments in their vicinity. Crude commodities, like timber, grain, and live-stock, required some improvement to be marketed with economy. But our mill industries, though they multiplied their units, continued to bear about the same relation to the productive economy of the country that they had borne for a century preceding the Revolution. One textile fiber, cotton, was produced far beyond our capacity to consume it, but the factories that employed it had little advantage of proximity over their transatlantic rivals. Coal and water-power conditioned the localization of manufactures, but did not, unaided by other circumstances, create them. Commerce, as a collector of raw materials and a distributor of their products, was the principal promoter of our industrial progress. In the days

[75] Michaux, *Travels to the Westward of the Alleghany Mountains*, 154; Bradbury, *Travels in the Interior of America in 1809*, 249.

when our wooden, wind-wafted carriers, inbound from the Baltic and the Mediterranean, from the Far East, and from the Spanish-speaking lands to the southward, came to us laden with wool, hemp, flax, and silk for our spinners, iron, steel, and copper for our smiths, mahogany for our cabinet makers, sugar for our refiners, and molasses for our distillers, our North Atlantic seaboard was populous with small manufacturing establishments that depended on other countries not only for their materials but also in some degree for their markets. We traded domestic sheeting in Chile for copper, and American locomotives in Russia for the iron from which they partly were manufactured. Yankee peddlers swapped clocks for hides in the very shadow of the Andes. The present reciprocity of our industry and foreign commerce is on a vastly larger scale, but it is hardly more varied, more widely reaching, or more vital to the prosperity of our manufactures than it was in those earlier years when we were the maritime rivals of the mother country.

CHAPTER XIV

THE RELATION OF TRANSPORTATION AND MARKETS TO MANUFACTURES

General conditions controlling inland transportation before 1860, p. 335. Overland freighting and manufactures, 336. Distribution of raw materials and manufactured products by waterways, 338. Influence of canals and steamboats upon manufactures, 347. Railways and manufactures, 351. Growth and organization of the domestic market, 354. Foreign markets and American manufactures, 360.

GENERAL CONDITIONS CONTROLLING INLAND TRANSPORTATION BEFORE 1860

Until after the War of 1812 up-country freighting was by pack-trains and wagons; down-country freighting was mostly by sloops, barges, keel-boats, and "arks"; coastwise commerce was in small sloops, schooners, and occasional larger vessels. So long as 20-ton sailboats were deep-water craft, the coast-line extended to the head of river navigation in a sense no longer true since goods are carried by steam. Middletown, 200 miles nearer Cuba than Boston, and 100 miles nearer the farming section of central New England than New York, was an active port for West Indian commerce. Hudson maintained several whaling ships; Albany traded directly with Calcutta; and even Troy supported a river fleet. Georgetown and Richmond loaded flour, and the latter city coal, on vessels that carried their cargoes without transshipment to northern ports. Commerce, like industry, was decentralized, its mechanism operated in small units, and its service capacity was as limited as the productive activities to which it catered.

During the first quarter century of independence waterway improvements were confined to short lock-canals around falls and rapids in otherwise navigable rivers. Interior settlement was exclusively riparian. The only long land routes were the trails of migration by which settlers passed from coastal to inland river systems. Though these routes gradually were improved, for many years they did not serve materially the freight business of the country.

Shortly after 1815 steamboats and canals transformed inland transportation in three ways: they cheapened the cost and shortened the time of carrying bulky freight to the interior; they connected formerly isolated transportation systems; and they opened to settlement country previously unavailable because not accessible to natural waterways. Soon after 1840 railroads, which till then had only limited and local importance, began effectively to supplement water transit.

Between 1850 and 1860 they ceased to be mainly feeders of river and canal routes and became trunk-line carriers between the Atlantic and the Mississippi.

OVERLAND FREIGHTING AND MANUFACTURES

Until railways were built overland communication had little positive effect on the growth and organization of manufactures. Soon after the Revolution private companies began to build and operate toll-roads in heavier traffic areas, but except in well-settled parts of the older Northern States even these failed to constitute a lengthy system of communication. Main highways mostly paralleled water routes, and none of them permitted economical freighting over long distances. Consequently, access to navigable waters still determined the location of mills and factories. These establishments sometimes supplied tributary territory for some distance inland, because inbound freight was a back-load balancing the bulkier country produce brought to water-served markets. But a landlocked factory would have been apart from this current of commerce or would have been located on it between its natural terminals, and therefore unfavorably situated for exchange. As manufactures distant from navigable waters were confined to households, or to small mills obtaining raw materials and supplying markets in their immediate neighborhood, American industries during this period were prevented from utilizing extensively the natural resources of the country. Our early factories were more remote commercially from many domestic materials than from those of Europe and Asia.

During the war with England, when British cruisers blockaded our ports and interrupted our coasting trade,[1] manufactures and provisions were conveyed by land and by inland waterways for considerable distances along the seaboard. Sailcloth was in such request for outfitting cruisers and privateers that Seth Bemis, a manufacturer of cotton duck at Watertown, shipped large quantities of these goods in his own wagons from Boston to Baltimore, Alexandria, and possibly to Richmond. His carters brought back flour, tobacco, and probably the sea-island cotton used in his factory.[2] Other New England manufactures found their way by combined land and river routes to the Central and Southern States. Almy and Brown, of Providence, shipped cloth and yarn from the Slater mills, together with boots and shoes, by wagon through New Haven to Hudson and thence by water and land to Philadelphia and Baltimore. Such south-bound traffic was important enough to determine the balance of trade between New England and other sections of the country, so that return freight was regarded as a back-load. The difference in the price of flour between Philadelphia

[1] *Connecticut Magazine*, I, 1, 1907.
[2] Bagnall, *Textile Industries*, 325–326.

and New York, on the one hand, and Providence on the other, was often no more than the cost of carriage; and north-bound freights were not always guaranteed to the New England wagoners.[3]

As compared with the expense of water transportation, however, land freights were at the best excessive. In 1810, with the coasting trade open, the average price of flour in Boston was 75 cents a barrel above that in New York; during 1813 and 1814, with British cruisers closing the Sound, this difference was $5.03.[4] While the price had remained stationary in the latter city and in Philadelphia, it had risen 50 per cent in the manufacturing towns of New England. To carry cotton all the way by land from Charleston to Philadelphia cost 20 cents a pound, and to bring it from Philadelphia to Providence by river and land cost 5 cents more.[5] Consequently, cotton for which southern planters received from 9 to 14 cents a pound cost northern manufacturers from 35 to 45 cents, or nearly double the rate prevailing before war interrupted sea traffic.[6] Obviously, only the exceptional conditions then prevailing, especially the almost total interruption of foreign trade, made it possible for American manufacturers to assemble raw materials and distribute products by such expensive methods.

Between Philadelphia and Pittsburgh overland freighting did not depend to the same extent on the transient circumstances of war, but the cost of carriage was prohibitive for bulky articles and commodities. Even before steamers navigated the Mississippi, many classes of goods, especially groceries, drugs, and provisions, were shipped more cheaply via New Orleans. Dry goods, firearms, and small metal articles came over the mountains.[7] In 1803 freight from Baltimore to Pittsburgh was $4.50 a hundredweight,[8] less than the rate from Philadelphia to the latter city for many years thereafter.[9] Baltimore had the advantage of more water-carriage. Potomac boats carried merchandise for one-fifth the rate charged by wagons.[10] In 1813, when war risks hampered the New Orleans route, and the government demand for horses and general high prices raised carriers' charges, it cost $9 to move 100 pounds of goods from Philadelphia to Pittsburgh.[11]

So long as pack-horses or wagons remained the only means of transporting merchandise, overland freight cost from 20 to 40 and even 60 cents a ton-mile, according to the condition of the roads and the dis-

[3] Almy and Brown, *Manuscript Letter Book*, Apr. 21, 28, and June, 30, 1813.
[4] *Finance Report*, 1855, 154; Hayward, *Prices of Forty Articles for Forty Years*.
[5] Almy and Brown, *Manuscript Letter Book*, Nov. 17, 1814.
[6] *Niles' Register*, XXIV, 182, May 24, 1823; *cf.* Burrill *et. al.*, *Petition to the Senate, 1815; Ware, Industrial Revolution in the New England Cotton Industry*, 55–56.
[7] Schoolcraft, *View of the Lead Mines of Missouri*, 45.
[8] Gephart, *Transportation and Industrial Development in the Middle West*, 91.
[9] *Cf.*, however, Philadelphia Society for Promoting National Industry, *Addresses*, Preface, vii.
[10] *American Museum*, VI, 238; *cf. American State Papers, Miscellaneous*, II, 994, 1003.
[11] Joseph Herzog, *Manuscript Letter Book*, Mar. 15, 29, 1813. This is reported to have been the rate as late as 1817; McMaster, *History of the United States*, IV, 427.

tance covered. The saving effected by railways is sufficiently indicated by the single fact that their early charges soon fell to 3 cents a ton-mile, or to about one-tenth the cost of wagon-carriage.[12] How radically this revolution in transportation, accomplished within a single generation, affected the market range of manufactures, is indicated by the fact that though money would purchase more labor one hundred years ago than it does now, it cost more to ship goods from the seacoast to the interior by freight than it does at present by parcel post. Thirty years later traffic conditions had so changed that the cost of carriage was not a materially higher percentage of the retail price of many articles of family consumption than at present.

DISTRIBUTION OF RAW MATERIALS AND MANUFACTURED PRODUCTS BY WATERWAYS

Prior to the canal-building era, which began about 1820, no change took place in the conditions of water transportation upon the Atlantic slope radical enough to affect the development of manufactures. As settlement pushed toward the headwaters of rivers navigable to the seaboard, new market relations were established. Thus the Susquehanna made parts of Pennsylvania, and even of central New York, tributary to Baltimore instead of to New York and Philadelphia. In 1798 a Baltimore merchant built merchant mills and cordage works at Tioga, to utilize the wheat and hemp of the Geneva Flats and the lake region of central New York. Flour could be carried by river from Bath to Baltimore for a dollar a barrel.[13] The previous year the Western Inland Company of New York had completed a short lock and canal system connecting natural waterways, so as to permit 15-ton barges to pass from the Mohawk to Lake Ontario.[14] This was one of several favoring conditions that determined the location at Albany and Troy of industries to supply the Great Lake settlements. So primitive were the wants and so self-sufficing the population of the frontier, however, that egress for produce rather than access for manufactures remained for some time the principal concern of western settlers. A company, fathered by George Washington, improved the navigation of the Potomac River by a system of channels, sluices, and locks, so as to make it navigable above tidewater for towed and poled boats during the open months from September till June. Between 1800 and 1822 traffic on this waterway averaged 633 boats a year, carrying 7,400 tons of produce and merchandise. That the bulk of this freight was from up the country, and in manufactured forms, is indicated by the

[12] *Niles' Register*, XXXIV, 155, May 3, 1828.

[13] Bishop, *History of American Manufactures*, II, 75; O'Callaghan, *Documentary History of New York*, II, 668, 669.

[14] *Maryland Gazette*, Oct. 26, 1797; Gallatin, *Report on Roads and Canals*, Apr. 4, 1808, in *American State Papers, Miscellaneous*, II, 734; also reprinted as *Sen. Doc.* 499, 61st Cong., 2d sess., 25; New York, *Laws in Relation to the Erie and Champlain Canals*, I, 20–24.

fact that its chief annual items were 51,625 barrels of flour, 1,474 barrels of whisky, and 261 tons of iron.[15] Similar improvements on the James helped to make Richmond a manufacturing center.

Throughout the Ohio and Mississippi valleys, however, communication afforded an opportunity for a new and active industrial development. This extended from two centers, established about the same time: Pittsburgh and its neighboring settlements and the pioneer communities of Kentucky, each of which contributed a distinctive element to the manufacturing activities of the western country. The former town, originating from a military post, acquired its civilian character principally by attracting mechanics, who catered to westbound immigrants and thus indirectly distributed the products of their handicraft to more accessible parts of the frontier. So rough was the northern route over the mountains that travelers often bade farewell to wheeled transportation upon reaching their confines. Consequently settlers came with scant comforts or conveniences for founding a home in the wilderness. When they arrived at the beginning of western navigation, their first demand was for flatboats and barges to carry themselves and their live-stock to their destination. A record of 177 boats, conveying 2,689 people, that passed a military post on the upper Ohio between October 1786, and the following May, notes that they carried 1,333 horses, 766 cattle, 102 wagons, and one phaeton.[16] Obviously these families were outfitted largely in their new homes.

In 1786 the *Pittsburgh Gazette* contained advertisements of cabinetmakers and upholsterers, followed the next year by the announcements of a white and lock smith, and a sickle and scythe maker. The first furnace west of the Alleghenies was erected in 1789, tributary by a short land-haul and water-carriage to Pittsburgh.[17] Hitherto iron bars had been brought from the eastern part of the State, bent over the backs of pack horses; and nails had come from a factory at Mercersburg, just across the mountains.[18] By the summer of 1789, however, a nail factory was working at Washington, in the neighboring county.[19] From this time the industrial advance of the new town was rapid. Within ten years it had at least 2 cut-nail factories, a toolmaker, a distillery, grain and lumber mills, and almost immediately thereafter glass works.[20] Local quotations of sole leather by the hundredweight, and of lead, suggest other directions of this development.[21] In 1803 a British manufacturer from Bolton was starting a factory for carding and spinning cotton; and a year later a second establishment, which

[15] *American State Papers, Miscellaneous*, II, 988.
[16] *Pittsburgh Gazette*, June 2, 1787.
[17] Swank, *Iron in All Ages*, 214.
[18] Rupp, *History of Cumberland County*, 376; Advertisement, *Pittsburgh Gazette*, June 20, 1789.
[19] Advertisement of Samuel Black, *Pittsburgh Gazette*, July 11, 1789.
[20] *Pittsburgh Gazette*, Oct. 27, 1798; Feb. 2, Mar. 2, June 1, July 7, 1799; Apr. 12, 1800; *cf. Minutes of Evidence, Orders in Council*, 466, 450, in Great Britain *Parliamentary Papers*, 1812, III.
[21] Advertisement, *Pittsburgh Gazette*, June 30, Aug. 25, 1798.

also wove several varieties of cloth, went into operation.[22] The previous year a brushmaker urged farmers to save their hogs' bristles, for which he paid 20 cents a pound.[23] Significant of the dominant local interest is a newspaper announcement, in September 1801, of a regular meeting of the Mechanics' Society of Pittsburgh, "at the usual place and time."[23]

In 1787 ship-building began on the Monongahela, 16 miles from Pittsburgh. Associated with this industry were iron-forges and rope-walks. In 1801 French merchants from Philadelphia established a ship-yard at the town itself. That summer they built a schooner and a ship, of 120 and 250 tons respectively, which were navigated with cargoes of flour to the West Indies and Philadelphia. The following year they built a brig of 200 tons, and in 1803 a ship of 350 tons. The latter sailed to Philadelphia with coal as ballast. The same season the Monongahela yard built a brig of 450 tons, which later ran as a coasting packet from northern ports to New Orleans, and was one of the fastest sailers of her day.[24]

In 1807 the larger industries of Pittsburgh included a furnace, 4 nail factories, 2 glass works, 2 potteries, 2 breweries, and a cotton factory, besides numerous mechanics' shops manufacturing for the general market.[25] Four years later the first steamboat on western waters was built at this city. Local mills, furnaces, and shops supplied all her machinery, as well as her hull and fittings. Her burden was between 300 and 400 tons, and she made the trip to Louisville in 70 hours.[26] The French traveler Crèvecœur had made the same trip 27 years before in 212 hours.[27]

Lexington, though not so favored as Pittsburgh by immediate access to a large river, early became the industrial center of the Kentucky settlements. The *Kentucky Gazette* began publication in 1787, and among its early advertisers was a manufacturer of "boating crackers and biscuit suitable for travelers."[28] A paper mill followed almost immediately the founding of this journal.[29] In 1791 the first furnace in the State was erected. Its products were distributed by wagon to Kentucky farmers, and by the Licking River, 7 miles distant, to Ohio

[22] *Pittsburgh Gazette*, Aug. 19. 1803; Oct. 26, 1804.

[23] *Pittsburgh Gazette*, Oct. 30, Nov. 15, 1801; Sept. 4, 1801.

[24] Bishop, *History of American Manufactures*, II, 87, 89. Michaux, *Travels to the Westward of the Alleghany Mountains*, 77. For similar enterprises at Marietta, *cf. id.* 110–111; Hildreth, *Original Contributions to The American Pioneer*, 17.

[25] Bishop, *History of American Manufactures*, 123, 124. Five years before this Fayette County had glass works and a paper mill; Michaux, *Travels to the Westward of the Alleghany Mountains*, 80; *cf. id.*, 152, 154.

[26] Bishop, *History of American Manufactures*, II, 173; Hunter, *A Study of the Iron Industry at Pittsburgh*, pp. 6–14.

[27] Crèvecœur, *Lettres d'un Cultivateur Américain*, III, 419.

[28] Advertisement, *Kentucky Gazette*, Apr. 25, 1789.

[29] Advertisement of Jacob Meyers, in *Kentucky Gazette*, Aug. 15, Sept. 1, 1787; Jan. 21, May 5, Nov. 14, 1792; Mar. 30, 1793; *cf.* also Perrin, *The Pioneer Press of Kentucky.*

Valley settlers.[30] By 1792 Cumberland cotton was for sale in the Lexington market, and country sugar and linen were bartered by local merchants.[31] The following year a mill advertised to break hemp for toll, and powder works were in operation.[32] A nail factory at Lexington, doubtless using iron from the neighboring furnace, repeatedly printed calls for "sprightly negro boys of 14 and 15 years," and for journeymen and apprentices.[33] Two shoe manufacturers were well enough established by 1796 to advertise, each for 6 or 8 operatives at a time.[34] In addition to these enterprises there were in operation at Lexington and vicinity before the close of the century, tanneries, rope-walks, fulling mills, a flour mill, a brewery, a distillery, a shot-tower, and tobacco and snuff factories, besides shops for making furniture, hats, and clocks. The settlers manufactured linen for sale, and evidently wore out enough of this material to justify a "rag stage," which toured the country so as to arrive at the county seats about court time, bartering dressed for undressed cloth and paper for rags.[35] Bourbon furnace, already mentioned, cast stoves, mill-irons, potash kettles, and especially sugar kettles;[36] for as yet sugar from New Orleans was not common and the maple groves of the country supplied even a surplus of this commodity.

French pioneers had occupied the lower Ohio Valley and the neighboring banks of the Mississippi for nearly a century when that territory came under the American flag. Lead mines were worked in Missouri as early as 1719. In 1797 a Virginia pioneer, who had mined this metal in his own State, secured a mineral grant in Missouri from the Spanish Government and erected the first reverberatory furnace in that district. Before the end of the century he was operating a shot-tower and supplying sheet lead to the Spanish arsenals at New Orleans and Havana.[37] Other local manufactures had been established in this vicinity before the first steamboat plied the Mississippi. In 1819 the Missouri settlements contained three shot-towers, a powder mill, wool carding and fulling machinery, besides tanneries, flour mills, sawmills, distilleries, and household manufactures of tow cloth and cotton. They were exporting lumber, flour, and gunpowder, as well as shot and lead.[38]

Throughout the western country, therefore, steam navigation was preceded by a self-sufficient local industry with its own system of dis-

[30] Swank, *Iron in All Ages*, 282–284; advertisement of William Beal, *Kentucky Gazette*, Mar. 31, 1792.

[31] Advertisements in *Kentucky Gazette*, Feb. 18, Mar. 31, Nov. 24, 1792.

[32] Advertisements in *Kentucky Gazette*, April 6, May 11, 1793; *cf.* Michaux, *Travels to the Westward of the Alleghany Mountains*, 154.

[33] Advertisements of Thomas Love, in *Kentucky Gazette*, May 25, 1793; Thomas Hart, in *id.*, Nov. 1, 1794.

[34] Advertisements of Israel Hunt and Nicholas Bright, *Kentucky Gazette*, Oct. 1, Oct. 8, 1796.

[35] Advertisement of Elijah Craig, *Kentucky Gazette*, Jan. 19, 1795.

[36] Advertisement in *Kentucky Gazette*, Dec. 15, 1797.

[37] Schoolcraft, *A View of the Lead Mines of Missouri*, 19; *cf.* Bradbury, *Travels in the Interior of America in the Year 1809*, 250–257.

[38] Schoolcraft, *A View of the Lead Mines of Missouri*, 43.

tribution and exchange. The commerce that originated from this industry and fostered its inchoate specialization was already of wide extent before steam communication quickened its activity and broadened its range. On a June Sunday, in 1795, five boats, with an aggregate burden of nearly 100 tons, left a single district in Sumner County, Tennessee, for the lower country, carrying cargoes of whisky, bar and cast iron, bacon, lime, and probably other unspecified local produce.[39] All of the goods actually enumerated were manufactured. A small cotton factory, with machinery for carding, spinning, and weaving, had been established in the same vicinity the previous year, but presumably supplied only a local market.[40] Shortly afterwards central gins were in operation, ginning for a toll of one-tenth, which was less than the hemp tolls in Kentucky, which were one-eighth for preparing for the hackle.[41] Merchants financed the planters, and probably found it convenient to own gins in order to assure prompt collections when cotton was picked. Hemp had been raised in Kentucky since 1775, and began to attract attention as a staple crop about 1790. So two textile fibers, which had to undergo processing of an elementary manufacturing character to fit them for distant transport, were regularly cultivated even before steam navigation was introduced and before the United States controlled a river outlet from the western country to the ocean. Cotton manufacturing at first was confined principally to yarn spinning, as it was in fact elsewhere in America, and its market was limited to the interior settlements. On the other hand, hemp manufactures found an outlet, by both land and water, to the Atlantic seaboard.

By 1800 rope-walks and shops where coarse linen was spun and woven were attaining commercial proportions, and Samuel Wilkinson, of Lexington, possibly of Rhode Island antecedents, advertised himself as a manufacturer of textile machinery.[42] The market range of these industries is indicated by the fact that in 1805 a single Kentucky manufacturer shipped to a Philadelphia merchant via New Orleans, in one consignment packed in "tight hogsheads," 20 tons of yarn. The same spring he shipped to Natchez, to be bartered for cotton, a boatload of baling-rope, plow-lines, and twine. He was also manufacturing for other agents at Philadelphia and New Orleans. Although twine freight was from $9 to $13 a bale to New Orleans, and $7.50 a reel to Philadelphia, this route was more satisfactory than via Pittsburgh, as he had found by previous experience. Even to Natchez the river freight was $1.50 per 100 pounds.[43] His consignments to New Orleans were bartered occasionally for logwood. In 1808 the same maker

[39] *Knoxville Gazette*, June 19, 1795.

[40] Advertisement in *Knoxville Gazette*, Nov. 11, Dec. 12, 1791. *Cf.* Michaux, *Travels to the Westward of the Alleghany Mountains*, 296.

[41] *E.g.*, advertisement in *Impartial Review and Cumberland Repository*, Oct. 23, 1806; Bradbury, *Travels in the Interior of America in the Year 1809*, 271.

[42] *Kentucky Gazette*, June 20, 1798.

[43] James Wier, *Manuscript Letter Book*, I, Feb. 23, 24; May 3, 5; June 21, 1805.

started three wagons to Tennessee, laden with bagging, country linen, and small bale-rope. The Nashville merchant who handled these goods shipped back cotton, part of which may have been spun at the Lexington factory.[44] Among this manufacturer's shipments to the Eastern States were deep-sea and log lines, housings, and twine, all grouped together in his invoices as "white work."[45] By 1809 land communication was so improved that part of his consignments went via Pittsburgh.[46] According to the Gallatin report, there were manufactured near Lexington, in 1810, 250,000 yards of duck and cotton bagging, most of which was presumably for southern markets.[47] The following year the manufacturer whose operations we have mentioned made direct shipments to New York and was in a position to manufacture 150 tons of yarn per annum. He used some water-retted hemp, but whether local or imported is uncertain.[48]

The war increased the activity with which domestic manufactures were exchanged across the mountains. In 1813 a Lexington merchant consigned 57 reels of yarn to an eastern correspondent, from whom he ordered in return narrow-striped and checked New England cloth, milled blue denims, New England white cotton shirting, and American playing cards.[49] The previous year a Buffalo merchant advertised that he had received "direct from Brown and Slater's factories in Rhode Island, a general assortment of American manufacture of woolen and cotton cloths.[50]

In the same way that during colonial days British traders took ventures of merchandise to America, which they disposed of and returned home, sometimes repeating the trip from year to year without taking up residence in the colonies, so prior to the war Yankee traders were accustomed to penetrate the West as far as the Missouri and upper Mississippi, with stocks of merchandise which they auctioned or otherwise disposed of at special sales, or peddled to settlers along the rivers, without making a permanent establishment in the country. But when a steady current of return products reached the Atlantic from this new territory, eastern merchants began to found branches or to acquire other settled connections in the West, where increased demand for products to exchange and the incentive of their capital fostered industries subsidiary to their trading enterprises.[51]

Shortly before the War of 1812, Joseph Herzog, a Philadelphia merchant, thus established his nephew at Lexington and St. Louis. His first plan was probably to ship west domestic and imported manu-

[44] James Wier, *Manuscript Letter Book*, I, Oct. 10, 1808.
[45] James Wier, *Manuscript Letter Book*, I, June 2, 1808.
[46] James Wier, *Manuscript Letter Book*, I, May 3, 1809.
[47] *American State Papers, Finance*, II, 428; Clay, *Works*, VI, 11.
[48] James Wier, *Manuscript Letter Book*, I, Apr. 22, 1810; July 14, 1811; Jan. 13, 1812.
[49] James Wier, *Manuscript Letter Book*, I, Mar. 27, 1813.
[50] Advertisement of David Eddy, in *Buffalo Gazette*, Sept. 22, 1812.
[51] Joseph Herzog, *Manuscript Letter Book*, May 25, 1811.

factures in exchange for unmanufactured lead. However, the Philadelphia and Pittsburgh glass houses had created such a market for red lead that a factory to make it was established almost immediately at St. Louis.[52] Within a year the manufacture of white lead was added to the preceding enterprise. A little later the abundance of lard and tallow, and the scarcity of soap during the war, suggested soap and candle works.[53] For these it was necessary to import rosin, which did as well as palm oil.[54] The molds were made with an eagle design, during the war with England, as patriotic western consumers refused to buy soap with the "windsor" crown, which heretofore had been the conventional stamp upon this article.[54] Candles were also made and sold in quantities down the river, principally through New Orleans agents. Soon a shot-tower was added to the previous enterprises, and this necessitated importing arsenic. Each new undertaking thus caused new commissions to the East. Pittsburgh was called upon to supply kettles for the soap-house, ironwork for the furnace and the shot-tower, and mechanical equipment for other purposes.[55]

Steamboats, when first introduced, were built on the model of keel boats or large rowboats, and made about 3 miles an hour against the current. In 1813 the firm was offered one of 18 tons for $1,000. The western manager possibly approved such a purchase, but his conservative Philadelphia uncle wrote they "must stick to keels yet awhile, until steamboats are more improved.[56] Many local manufactures were trafficked along the rivers that formed the arteries of this commerce. Keel boats left St. Louis with cargoes of lead, lead colors, soap, candles, and furs, sometimes routed to New Orleans, but more often during the war to Pittsburgh. However, all the lading was not intended for these destinations, but a price was established at which the head boatman was authorized to sell along the route. One supercargo was directed to "trade in a good deal of country linen, cotton stripes, stoneware, cordage, etc.," on the journey.[57]

There are items in the correspondence of this firm showing that tow and flax linens were being shipped from Pittsburgh to Philadelphia, and even reconsigned from the latter city to Baltimore.[58] In the West these fabrics usually commanded money[59] and were distinguished thus from other local products which generally could be bought by barter. Pittsburgh glass-makers took most of the red lead. The proceeds of these sales were invested locally in iron bars for Philadelphia, when

[52] Joseph Herzog, *Manuscript Letter Book*, May 11, 1811. Pittsburgh glassmakers also used Missouri sandstone; Saxe-Weimar, *Reise durch Nord Amerika*, II, 119, 120.
[53] Christian Wilts, *Manuscript Letter Book*, July 19, Dec. 20, 1812.
[54] Christian Wilts, *Manuscript Letter Book*, Sept. 4, 1813; June 26, 1813; Apr. 23, 1814.
[55] Christian Wilts, *Manuscript Letter Book*, Sept. 20, 1814.
[56] Christian Wilts, *Manuscript Letter Book*, July 31, Sept. 15, Oct. 9, 1813; Joseph Herzog *Manuscript Letter Book*, Sept. 2, Oct. 17, 1813.
[57] Christian Wilts, *Manuscript Letter Books*, Mar. 27, Apr. 17, 1813.
[58] Joseph Herzog, *Manuscript Letter Book*, June 19, 1811.
[59] *E.g.*, Christian Wilts, *Manuscript Letter Book*, Mar. 27, 1813.

freights were favorable, and for the West. Some red lead also went through to Philadelphia, though it was inferior to that made in the latter vicinity. Single shipments from St. Louis amounted to 30,000 pounds. Returns came in the shape of shoes, cottons, Lancaster rifles, and assorted merchandise from the East, and a variety of staple manufactures from the Ohio Valley.

The time to buy shoes in Philadelphia was "when the Lynn people came in, in the spring and fall." One September these goods were scarce, "the New England traders not having yet come on."[60] Pittsburgh manufacturers, with establishments employing some 20 hands each, and producing as many thousand dollars' worth of boots and shoes a year, also sold their goods throughout the river country.[61] Among the cottons that found their way into this commerce were American prints, described as "very coarse," but selling during the war for 31 cents a yard.[62] Our hostilities with England did not cause much scarcity of ordinary cotton manufactures, which were made at home and also received from the East Indies. Muslins were reported "as low as usual" in Philadelphia at a time when woolens and hardware were at unprecedented prices.[63] Among the goods ordinarily bought along the Ohio for the St. Louis trade were "saltpeter, powder, paper of all kinds, rope, hemp, linens, threads, linsey, whisky, pork, bacon, vinegar, flour, nails, glass, and a great list of articles besides."[64] Pottery, cotton, and maple sugar might have been included in the enumeration. Pittsburgh scythes and other implements likewise occur in these invoices of western manufactures marketed west of their origin.

With the return of peace, merchants and manufacturers lost through the precipitate fall in value of their stocks in hand more than they had gained by the less abrupt rise of prices at the opening of hostilities. At Pittsburgh most works were closed or but partly operated on account of the heavy importation of foreign goods. This was due not alone to the low price of such merchandise at the seaboard, but also to the improvement of inland communication under the stimulus of war conditions. We have seen previously that the same turning of the nation's productive energy to inland development occurred at the time of the Revolution. During March 1815, one Lexington manufacturer shipped 50,000 pounds of yarn by wagon to Baltimore. Three months later he wrote that of the 14 rope-walks in the city not one was working.[65]

Upon the whole, however, western manufacturers were still sufficiently removed from the full shock of foreign competition to recover from its effects sooner than those upon the coast. Kentucky industries

[60] Joseph Herzog, *Manuscript Letter Book*, May 20, Sept. 14, 1813.
[61] *Documentary History of American Industrial Society*, IV, 48, 49.
[62] Joseph Herzog, *Manuscript Letter Book*, Nov. 10, 1813.
[63] Joseph Herzog, *Manuscript Letter Book*, Dec. 9, 1811; "muslins" meant cotton shirtings.
[64] These goods were marketed to some extent east of the mountains; Joseph Herzog, *Manuscript Letter Book*, Apr. 12, 1813.
[65] James Weir, *Manuscript Letter Book*, I, Mar. 26, June 1, 1815.

revived the more readily because after the war their market shifted to a new and broader area. Ship-building at eastern ports did not recover its earlier prosperity or make the same demand as previously for cordage, but with the reopening of foreign markets cotton-growing extended rapidly and into regions naturally tributary to up-river manufacturers. Covering for cotton bales, therefore, was in relatively more request than cables for ships.

In 1816, though rope-walks were idle, hemp was scarce.[66] That year occurs the first entry of bagging shipped by steamer to New Orleans. Consignments of 250 pieces at a time went from one maker to a single agent in the latter city.[67] The same manufacturer sent bale cloth to Huntsville and Winchester, Alabama, in wagons that brought back cotton.[68] He not unnaturally ordered machinery from the East the following year for a cotton factory at Lexington.[68] Thenceforth he shipped bagging by river and sea to Savannah and Charleston, as well as to his older customers at Natchez, Nashville, and Huntsville; but at the same time he consigned cotton yarn to agents at Louisville and St. Louis, and even to purchasers in the States from which the cotton came.[69]

Steubenville, Cincinnati, and Louisville shared in this early movement toward manufactures. At the close of the war Cincinnati had glass works, 4 cotton mills, a woolen factory, white-lead works, flour and lumber mills, furniture shops, and a barrel factory using patent machinery. Several of these establishments were operated by steam, and though at first not necessarily using coal, soon came to depend upon that fuel, which was cheaply brought down the river.[70]

Obviously this specialization of trades using metal and fuel at Pittsburgh, and of certain textile manufactures at Lexington, would not have been possible so soon after settlement penetrated these regions without river communication. Compared in volume, organization, and technical development with the industries of to-day, the undertakings thus fostered were small and elementary. But they anticipated with some qualifications the influence that during the next forty years river transport was to have on the geography of western manufacturing. On the Atlantic seaboard that geography had been determined before the colonies were independent.

Meanwhile the reciprocal relations of East and West—as those terms were then understood—were still plastic. Their history was to be made by steamboats and canals, and those factors in the economic differentiation of localities had not come effectively into play.

[66] James Weir, *Manuscript Letter Book*, II, July 25, 1816.
[67] James Weir, *Manuscript Letter Book*, I, 160; II, July 16, 1816.
[68] James Weir, *Manuscript Letter Book*, II, Feb. 13, 1817; July 29, 1817, and p. 91.
[69] James Weir, *Manuscript Letter Book*, II, July 18, 1816; Feb. 21, 1817; Mar. 8, May 5, 1824.
[70] Drake, *Natural and Statistical View of Cincinnati*, 143–145.

INFLUENCE OF CANALS AND STEAMBOATS UPON MANUFACTURES

An attempt to sketch even briefly the history of inland transportation between 1820 and 1860 does not fall within the province of this study. New England canals served local convenience, but did not change materially the conditions under which manufacturing was prosecuted. That section used fresh water for power, but salt water for freighting; and the raw materials that employed its characteristic industries, as well as the products into which they were transformed, continued to be assembled and distributed by sea. In New York State steam and canal navigation served important functions. An old trade route to Canada was given commercial efficiency by the completion, in 1823, of a canal connecting the Hudson with Lake Champlain. Two years later the Erie Canal, which was destined to remain our most important artificial waterway, was opened from Albany to Buffalo. Steamboats on the Hudson and on the lakes already had multiplied the potential service of these new highways of commerce. The conjunction of these influences affected manufactures primarily by increasing the rapidity with which the West was settled and the call for material instruments for its subjugation. The Erie Canal made conditions favorable for the development of primary manufactures, like grain and saw milling, in the West, and of secondary manufactures, like the making of boots and shoes, vehicles, implements, stoves, and textiles, in the East. Significant of this is the fact that for some years the Great Lakes Basin developed no industrial towns, like Pittsburgh, Lexington, and Cincinnati. That region depended on New York City and on the manufacturing district along the upper Hudson and the Mohawk for the kind of articles that Ohio River cities furnished to settlers in the Mississippi Valley.

Even before the construction of the canal New York freight entered the Ohio country via the Hudson. In 1818 it cost $5.56 per hundredweight to convey goods from New York to Louisville. They went by steamer to Albany, thence by land to Schenectady, after which they were carried by water, except for two short portages, around Niagara and from Lake Erie to the headwaters of the Allegheny. This traffic moved in 5- and 10-ton boats.[71] As soon as the Erie Canal was opened freight from New York to Columbus fell to $2.50 per hundredweight. It still remained $4 per hundredweight from Philadelphia.[72] Pittsburgh could be reached from New York with only 8 miles land-carriage. One of the first recorded effects of the new route upon manufactures was to encourage iron-making in Ohio for the New York market. Along the southern shore of Lake Erie deposits of bog ore were discovered which produced a very tough iron suitable for castings. This found a ready market at the stove and hollow ware foundries upon the upper Hudson.

[71] Miller, *New States and Territories*, 96; *cf.* also McMaster, *History of the United States*, IV, 427.

[72] *Niles' Register*, XXIX, 262, Dec. 24, 1825.

Among the boats arriving at Albany in 1826 was the *Lion of Ohio*, laden with pig-iron from that State.[73] The same year near Painesville, close to Lake Erie, 3 furnaces were in operation, and 3 more, together with an equal number of forges, were under construction. It was estimated that during the season 1,000 tons of pig-iron would be forwarded from these works to Albany.[74] But most of the coast-bound traffic at first consisted of lumber, flour, and whisky. Expressed in money terms this trade was one-sided. Between 1829 and 1833 Cleveland received by water more than twice the value of the goods shipped from that port During these four years its trade increased between eight and ten fold and remarked a corresponding expansion of primary manufactures in response to new traffic conditions.[75]

This current of commerce sustained a growth of varied industries along its course, which contributed chiefly to west-bound merchandise. Of the through freight eastward by the Erie Canal, before 1850, less than 1 per cent, expressed in values, or somewhat under $1000 per annum, was classified as manufactures. After 1850 the proportion rose, but only in negligible measure. Even the way-freight going east included less than 2 per cent of manufactures, and this declined after 1850, probably on account of railway competition.[76] If we go behind the classification of merchandise in canal statistics, these figures are modified, though not enough to involve significant implications. In 1845 the canal carried east in quantities worthy of record, not only such materials as iron, lead, wool, leather, and potash, but also ironware, woolen and cotton cloth, furniture, brooms, glass, soap, candles, and starch. One of the most important raw materials using the canal was cotton; 60,000 bales were shipped in 1854 by the river, lake, and canal route from southern plantations to northern and eastern manufacturers.[77]

Until 1850 the Great Lakes had less influence than the rivers to the south of them upon the trend of manufacturing development. This was partly because they served country having similar climate and products throughout, and industrially differentiated only by its later settlement from the States with which their eastern outlets communicated. Their later function, of assembling raw materials for great industries, was only faintly indicated before the Civil War. It was not until 1855 that the completion of the Sault Ste. Marie canal opened direct communication with Lake Superior. That year 1445 tons of iron ore passed through this channel. By 1860 the amount had reached 117,000 tons, and was reënforced by several thousand tons of iron. Copper had been mined in the northern peninsula of Michigan for ten

[73] This was from Madison Furnace or Madison Township, not Madison County; *Niles' Register*, xxxi, 4, Sept. 2, 1826.
[74] *Niles' Register*, xxx, 422, Aug. 12, 1826.
[75] *Cleveland Herald*, quoted in Hazard, *Register of Pennsylvania*, xii, 212, Oct. 5, 1833.
[76] *Report on Foreign and Domestic Commerce, Sen. Ex. Doc.* 55, 38th Cong., 1st sess., 141.
[77] *New Orleans Crescent*, quoted in Edwards, *Gazetteer of Virginia*, 143.

years when the canal was opened, and the production had increased from less than a ton to 3100 tons per annum. During the next five years shipments from this region rose to over 8,000 tons.[78] For lead the lake route competed with the Mississippi, and the bulk of this article was carried by the latter highway. Nevertheless, even before railways reached Milwaukee, the mines of Wisconsin shipped to some extent through that city.[79]

While New York was served by a system of waterways that contributed primarily to its commerce, making it the great Atlantic mart for western produce, Philadelphia was the traffic terminus of a system of canals mainly industrial in their function. This character was given them by their importance as carriers of coal and iron. Ore, limestone, and fuel were assembled by them from districts that previously, for lack of transportation, were too far apart to coöperate in a process of manufacture. By 1835 some Pennsylvania furnaces were using ore from mines 50 miles distant.[80]

These waterways also facilitated communication with the West, though they did not afford a continuous route across the mountains. They conveyed goods to the Ohio in ten days, which was about the time between New York and Buffalo. It cost $4 to carry a barrel of flour from Pittsburgh to Philadelphia in 1819, and but $1.63 fourteen years later.[81] In 1834 charges between these two cities were 55 and 60 cents a hundredweight for eastbound freight, and $1 a hundred weight for westbound.[82] Eastern manufacturers claimed that freight shipped west should have the lower rate. Ocean carriers considered European goods a back-load to America, and gave them their cheapest tariff, but our canals reversed this policy and charged heaviest upon domestic wares consigned to the interior.[83] At the prices quoted merchandise could be carried from the upper Ohio Valley to Philadelphia via Pittsburgh more cheaply than via New Orleans, even though steamboats within fifteen years had reduced river freights to one-fifth their former rate. From Louisville to Philadelphia the cost per ton was $16 by the Mississippi River and $14 by the Pennsylvania canals, which were connected by a short railway through the mountains. The economy of the direct route was increased further by a saving of twenty to twenty-five days in time, and of transshipment charges and commissions at New Orleans.[84] However, the latter city controlled the Mississippi and the lower Ohio Valley

[78] *Report on Foreign and Domestic Commerce, Sen. Ex. Doc.* 55, 38th Cong., 1st sess., 154.

[79] *Niles' Register*, LXI, 23, Sept. 11, 1841; *id.*, 119, Oct. 23, 1841; *id.*, 304, Jan. 8, 1842; *Milwaukee Sentinel*, Feb. 1, Mar. 12, 1843.

[80] *Harrisburg Chronicle*, quoted in Hazard, *Register of Pennsylvania*, XVI, 50, July 25, 1835.

[81] Philadelphia Society for Promoting National Industry, *Addresses*, Preface, vii; *Niles' Register*, XLIV, 178, May 18, 1833.

[82] Hazard, *Register of Pennsylvania*, XIII, 144 Mar. 1, 1834; *id.*, 393–395, June 21, 1834.

[83] Secretary of the Treasury, *Reports on Finance*, VII, 647.

[84] Philadelphia Board of Trade, *Report of June 12, 1834*, in Hazard, *Register of Pennsylvania*, XIII, 393–394, June 21, 1834.

trade until the railroad era. While iron from northern Ohio found its way to the eastern markets via the Erie Canal, some furnaces tributary to the Ohio River shipped their product via New Orleans as far as New York City, and even experimentally to England.[85] In 1832 Boston nail factories, using Swedish iron and shipping via sea and river, shared with Pittsburgh the Cincinnati and Louisville markets.[86] A year later the completion of a canal from Cleveland to Portsmouth opened a third water route between the Ohio and Atlantic.

Waterway improvement and steam navigation reduced freight charges between the Atlantic seaboard and the interior from 7 and 8 cents a ton-mile, before the completion of the Erie Canal, to 5 cents a ton-mile during the following decade, and to about 1 cent a ton-mile between 1850 and 1860.[87] The economy of transportation thus effected was even greater than these rates indicate, on account of the reduction of distances due to more direct water communication. In 1819 the freighting distance from New York to Louisville, by the Albany and Great Lakes route, was over 1500 miles. After the completion of the Erie and the Ohio canals, the distance was reduced to about 1000 miles.

Time occupied in transit was an important element in the cost of production, and partly accounted for the long credits then customary in mercantile transactions. In 1803 Almy and Brown, notifying Elisha Colt of Hartford of a shipment of yarn from Providence about December 3, informed him that he might expect it to arrive "in the course of the winter."[88] During the War of 1812 letters were carried from St. Louis to Philadelphia in twenty-two days, and from Philadelphia to Fall River in from nine to eleven days.[89] However, the usual traveling time between Pittsburgh and St. Louis was three weeks, and freight occupied from twenty-five days to a month in transit.[90] In 1819 the quickest way of carrying goods from New York to Louisville was via Geneva, Olean, and Pittsburgh, and took twenty-two days. The more usual lake route, involving less land-carriage, required thirty-five days.[91] By 1825 steam and canals had so shortened distances, as expressed in days of travel, that it was possible to go from New Orleans to New York via the Mississippi, the Ohio River, the Erie Canal, and the Hudson, in twenty-four days, the time often necessary ten years before to go from Pittsburgh to the mouth of the Ohio.[92] Steamers required thirteen days to go from New Orleans to St. Louis, and it was a week's journey from Detroit to New York City.[93] In 1833, before the advent of railways,

[85] McLane, *Report on Manufactures*, II, 861, 866.

[86] McLane, *Report on Manufactures*, II, 244, questions 11 and 17; 251, question 32; 315, question 32; *cf.*, however, quotation from *Pittsburgh Gazette*, in Hazard, *Register of Pennsylvania*, XII, 352, Nov. 30, 1833.

[87] Miller, *New States and Territories*, 96; *Niles' Register*, XXIX, 262, Dec. 24, 1825; *De Bow's Review*, XX, 81, Jan. 1856.

[88] Almy and Brown, *Manuscript Letter Book*, Dec. 3, 1803.

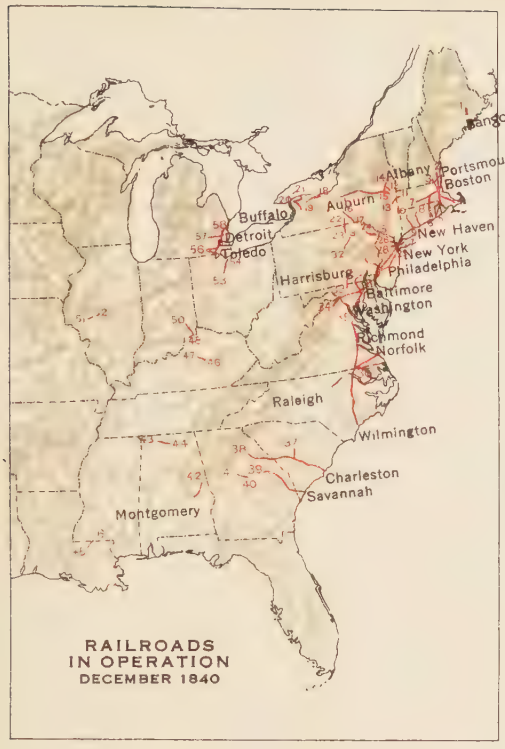
[89] Joseph Herzog, *Manuscript Letter Book*, Nov. 4, 1811; *Bagnall Papers*, III, 1912.

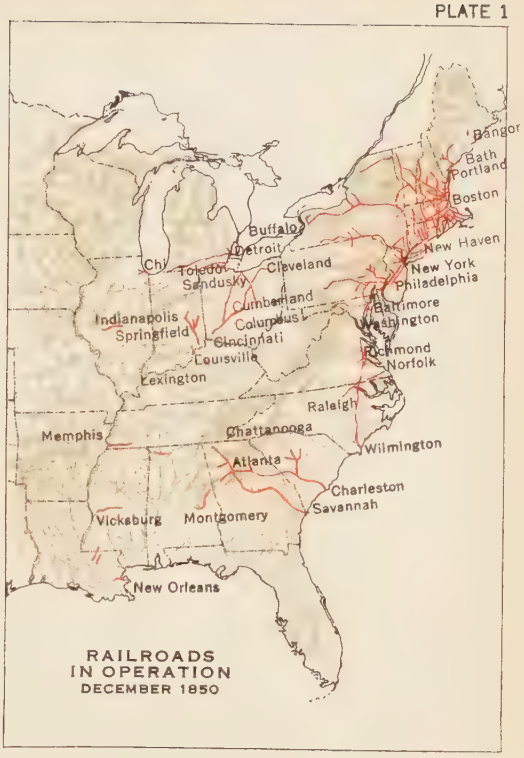
[90] Christian Wilts, *Manuscript Letter Book*, Jan. 18, 1814.

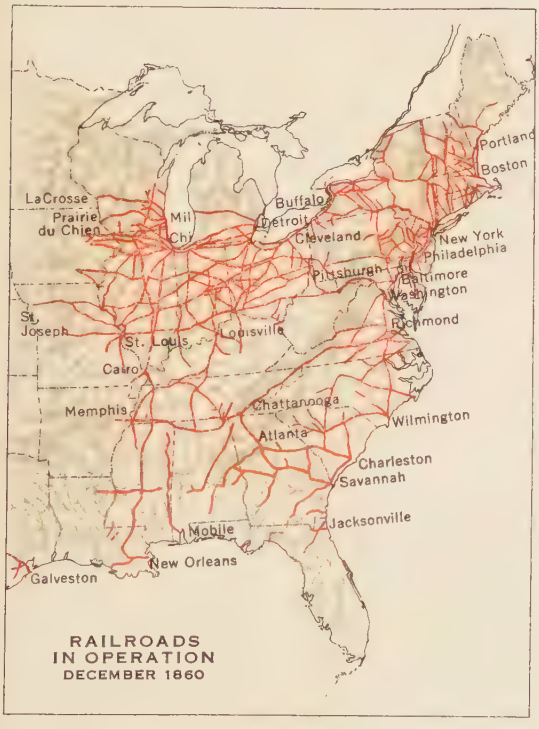
[91] Miller, *New States and Territories*, 96.

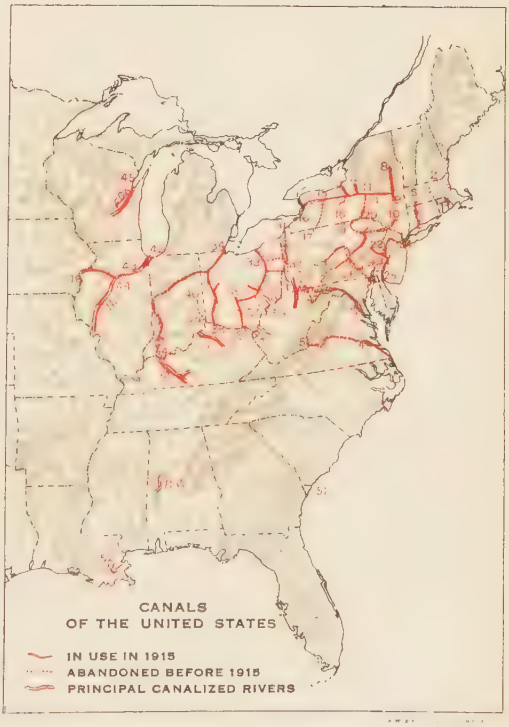
[92] *Niles' Register*, XXIX, 147, Nov. 5, 1825.

[93] Saxe-Weimar, *Reise durch Nord Amerika*, II, 121; *Niles' Register*, XXIX, 96, Oct. 8, 1825.









INLAND TRANSPORTATION

The canal map is for 1915, but the Hennepin Canal is the only important waterway built after 1860, and many of the abandoned canals ceased operation before that date.

(Plates 1, 2, 3, 4 and 5 were prepared by R. H. Whitbeck.)

ALBION COLLEGE
LIBRARY

freight reached St. Louis fifteen days after leaving Baltimore.[94] This time was not much reduced until the opening of the Baltimore and Ohio Railway to Wheeling.

In 1840, therefore, the inland resources of the settled portion of the Continent were mostly accessible by water. Raw materials from distant places could be assembled economically for manufacturing. Markets throughout the country were reached at a fraction of the cost for transportation twenty years before. Accompanying this change, quicker, surer, and more regular communication of intelligence between distant sections made it possible to conduct business operations on a larger scale than previously. All these influences favored industrial concentration and specialization, expressed in larger plants and in a more definite regional grouping of manufactures.

RAILWAYS AND MANUFACTURES

Railways, in addition to creating by their own mechanism a new order of industrial demands, greatly amplified the effect of all earlier improvements in transportation. They represented a long step ahead in the emancipation of society from topography and climate. At first the seacoast, then rivers, and later canals following the path of rivers, had determined the direction and extent of our economic control of the continent. With the successful application of steam to land-carriage these coastal and fluvial limitations vanished. All water traffic had depended on the seasons. Winter stopped canal and river trade in the North as effectively as it did agriculture. When commerce ceased industry slackened; capital lay idle; labor was thrown out of employment and its skill deteriorated. Therefore, when railways brought to transportation the three gifts of directness, speed, and continuity, they created conditions profoundly affecting manufactures.

This revolution was accomplished within less than the compass of a generation. Schoolboys who saw the first train ever moved by steam in America might ride by rail from the Atlantic to the Mississippi before they were thirty. In no other country were industrial conditions affected by these changes as they were in America. Great Britain was a land of comparatively short distances, possessing well-built highways, canals, many small navigable rivers, and harbors readily accessible from all its parts. Before the railway era western Europe already had a perfected system of inland communication, serving a dense population and manifold industrial enterprises. Abroad the economic organization of society had been slowly compacted, each part adjusted to its fellows, and every branch developed in due succession. In the United States all the economic activities of the nation, banking and exchange, transportation and commerce, agriculture and manufactures,

[94] *Niles' Register*, XLIV, 178, May 18, 1833.

simultaneously adopted new machinery and methods. Capital was transferred violently from old fields to new, amidst crises of speculative excitement; population shifted with great rapidity both from territory to territory and from trade to trade; and manufactures responded to this instability with fluctuating prosperity, uncertain tenure of processes, plants, and localities, but upon the whole with vigorous and unchecked growth. Only extremely favorable conditions, compensating the confusion accompanying the riotous occupation of a continent, made this possible. One of these was the constantly accelerated velocity of economic progress. And to that feature of our history steam transportation made the largest contribution.

Railways stimulated the growth of the population. From 1840 to 1860, the period of their most rapid extension, the rate of increase was higher than at any other time in our national history. Probably this was because railroads added vastly to areas of profitable agriculture and thereby invited immigration and raised or maintained the native birth-rate. However this may be, markets for manufactures grew at a rate not only equaling the accelerated growth of population, but even exceeding it. This was because that population made exceptional demands for development machinery and because, for the first time in the Northern States, it turned at once to commercial agriculture. Earlier settlement penetrated the country ahead of marketing facilities and supplied its wants by household industry. But railways followed so closely in the path of later pioneers that the economics of the new frontier was based on exchange and specialized production. Per capita homespun manufactures declined as the ratio of railway mileage to area increased.[95]

Few navigable rivers flow into the Great Lakes, nor are their natural harbors numerous. Consequently the development of their littoral was retarded by lack of transportation. Steamboats had cheapened and quickened river carriage so that immigrants flocked into the West through New Orleans, and the traffic of the Great Lakes country was drawn to the Mississippi highway. This diversion of commerce to a southern port was a disadvantage to eastern manufacturers in the northwestern market, for our heaviest foreign shipments were of cotton, and from the cotton metropolis trade routes, freights, exchange, and mercantile connections favored the importation of European goods. As rapidly as railways supplanted rivers and canals, and made tributary to the northern lakes the trade that formerly had gone down the Mississippi, they placed eastern factories intermediate on the route from Europe to these markets, instead of at the end of a branch line almost equally distant from them.

Railways sometimes were promoted directly by manufacturing corporations. Even before their day Samuel Slater had been a heavy

[95] See Appendix XII.

subscriber for turnpike stock, because he believed good roads "a necessary appendage to the manufacturing interest;" and he was an early advocate of railways.[96] The road from Lowell to Boston was suggested in 1830 by the proprietors of the mills on the Merrimac, who ultimately gave $100,000 as a bonus to the undertaking. Previously Lowell goods had been shipped to Boston by river and canal during the summer and by teams during the winter.[97] The Naugatuck Railroad was promoted by the brass manufacturers of that valley, as indispensable to their enterprises, though at first they anticipated no other profit from its operation.[98]

When the great railway development of the middle years of the century occurred, revolutionizing trade routes and transportation conditions throughout the whole nation, Massachusetts for a time suffered from its effects. This was partly because the Western Railway, which had then become an important outlet for New England manufactures to interior markets, sacrificed its eastern clients in an attempt to meet water competition to New York.[99] It was not until after a period of readjustment that Massachusetts manufacturers secured the special consideration from railways that later enabled them to continue in competition with other manufacturing centers situated nearer to the consuming areas of the West.

For many years it was believed that railways would not compete with water carriers in the transportation of the heavy raw materials used in larger industries. The Reading Railway of Pennsylvania first demonstrated that coal could be carried by land as cheaply as by water.[100] This extended the geographic range of fuel-using industries. Lack of transportation had limited even the use of water-power. Alexander Hamilton's correspondence contains allusions to the elimination, for this reason, of otherwise desirable manufacturing sites from the projects of the company he promoted. Accessibility by water to the eastern Ohio and Pennsylvania coal fields accounted for some of the first industrial enterprises at Cleveland and Buffalo.[101] But it was not until railways became coal carriers that the manufactures of those cities acquired real importance. In 1854 Buffalo welcomed the completion of a railway to Pittsburgh as opening a new era of manufacturing prosperity. The conjunction of coal, iron, and copper from Pennsylvania and Lake Superior already made this city a metal-working center of importance. Its manufactures then included 13 iron-works and 2 white-lead factories, besides copper and brass foundries,

[96] White, *Slater*, 239.
[97] *Bagnall Papers*, III, 2098–2101.
[98] Lathrop, *Brass Industry in Connecticut*, 81.
[99] Lawrence and Shaw, *The Present Condition and Future Growth of Boston.* The Western Railway is now known as the Boston and Albany.
[100] Jones, *Economic History of the Anthracite Tidewater Canals*, 136–137.
[101] Whittlesley, *History of the Coal and Iron Business of Cleveland.*

using materials assembled from the Mississippi Valley and the remoter parts of the Great Lakes Basin.[102]

Canals and railways changed the carrying of goods into a specialized business, conducted by men trained in that vocation, and supported by a sufficient capital to assure responsibility. Freight was conveyed on regular schedules and arrived at its destination on predictable dates. No longer did the risks of transportation fall mainly on the manufacturer. His plant no longer was subject to interruption on account of the delayed arrival of materials. This better organization of transportation gave an assurance and precision to business that contributed greatly to the economy of manufacturing. It assisted in making continuous industries that previously had been seasonal; it lessened the amount of capital tied up in goods in transit and in warehouse stock; it tended to prevent the alternate oversupply and undersupply of distant markets; and it lessened the speculative dangers that such market variations introduced into legitimate productive enterprises.

GROWTH AND ORGANIZATION OF THE DOMESTIC MARKET

It will be recalled that one peculiar condition attending the development of colonial manufactures was the rapid expansion of their domestic market through extension of settlement and growth of population. These conditions continued after the inauguration of the Republic. A rapidly increasing demand for its products naturally gives an optimistic spirit to industry. If the demand grows steadily as well as rapidly, manufacturers are constantly concerned in extending their operations. This involves enlargement of plants and affords repeated opportunity for making physical improvements. Meantime, the speculative possibilities of such a market lead to periods of over-expansion. At these crises plants with inadequate capital and antiquated equipment are pushed to the wall. The unfit are eliminated, and average industrial efficiency is increased.

A rising standard of living and a constantly greater per capita consumption of manufactures accelerated the rapidity with which the home market was extended by the growth of population. The history of this extension may be divided into two periods, one of which anticipated and the other accompanied the fuller development of factory industries. During the first quarter century of the Republic, conditions of settlement that arose as soon as colonial pioneers struck inland from the seaboard were repeated, but on a larger scale and with more rapid effect than previously. The territory of a State was industrially subdued in the time formerly required to clear and populate a county, and the number of American consumers in 1800 was already double the number at the outbreak of the Revolution and was nearly to double again during the following decade.

[102] Henderson, *Annual Statement of the Trade and Commerce of Buffalo*, 1854, 31, *et seq.*

This great extension of settlement tended to maintain those frontier conditions characteristic of our earlier colonial history. Great districts remained sparsely populated, with imperfect means of local communication, and by necessity largely self-subsisting. Consequently we mark no decline, but rather a decided increase, in the aggregate product of homespun industries. For the same reason in the new settlements such neighborhood manufactures as sawmilling, the reduction of iron in bloomeries, and handicraft trades remained dispersed, though they were integrating to some extent in older sections of the country. At the same time the convenience of river transportation, performing the same function that the coasting trade had rendered the first manufactures of New England and Pennsylvania, enabled the specialized industrial communities already described to grow up at interior points, where they were protected from eastern and European competition by the cost of carriage over the mountains.

Outside of a few favored districts, the market demands of this new country remained as simple as those of the seaboard colonists a century before. The pioneers who, during the forty years between the outbreak of the Revolution and the conclusion of our second war with England, had extended our settlements from the Alleghenies to beyond the Mississippi, and who had taken possession of the Genesee country and the Western Reserve, thus assuring our hold upon the Great Lakes, clothed themselves with durable homespun in preference to the finer manufactures of Europe, fought the Indians with Pennsylvania rifles in preference to imported muskets, cleared their fields and built their cabins with American axes, and tilled their farms with implements for the most part made by country blacksmiths from the charcoal iron of the Allegheny furnaces or the neighboring forges. The saltpeter for their gunpowder came from the caves of Kentucky, and the lead for their bullets from the mines of Missouri. Their cordage and harness were supplied by the Kentucky hemp-fields and by their local tanners and curriers. Their water mills ground flour not only for their own consumption, but for exportation, and left a supply of grain for the distilleries. Their cattle and swine were driven to market over the mountains, or slaughtered and packed with salt from the Kanawha and Onondaga salt-wells and shipped to down-river markets in keel-boats and barges or sea-going vessels of their own building. Their demand for foreign luxuries was slight indeed. Beyond the material needs of the new country, their own paper mills and presses furnished them with the first requirements of a reading people. Meanwhile, New England and the Central States were supplying an increasing local demand for commercial manufactures by importation and by the products of their own mills. Domestics displaced homespuns first in the vicinity of the factories. But as soon as improved roads and denser settlement permitted merchandise to circulate through wider channels, they pene-

trated the interior and began to supplant the household products of the pioneer.

European wares first filtered through to the frontier in course of the Indian trade. As this movement increased, it gradually included a growing proportion of domestic merchandise. About the beginning of the century Almy and Brown were shipping Rhode Island yarn to Kentucky. For some years previously towcloth and homespun had been bartered across the mountains.

A second era in market development opened with the introduction of steam navigation and the improvement of waterways. The easier access to western consumers that these changes made possible helped to restore manufacturing prosperity after the depression of 1820. However, the conquest of these markets was hampered at first by the commercial weakness, as well as by the technical defects, of American industry.

Early mill-owners devoted what now seems a disproportionate share of their capital, time, and energy to the process of purchasing supplies and selling products. Their buying and marketing organization was almost as primitive as that of a modern farmer. Connecticut clockmakers, after completing a small stock of wares, peddled them through the country on pack-horses. They interrupted shop operations, also, to make distant journeys with wagons for raw materials.[103] Mill-owners, when stock accumulated, drove with it to Boston or Providence, disposing of what they could to country merchants along the way and of the remainder in the city in exchange for wool, cotton, and store supplies for their employees.[104] This primitive commercial organization of manufacturers soon disappeared from New England, but persisted in the West and South for several decades. As late as 1832 furnace and forge owners in western Pennsylvania still retailed their iron from flatboats to purchasers along the Ohio and Mississippi.[105]

Three marketing methods were developed by New England textile mills: consignment on commission to wholesale merchants, the employment of a selling agent, and sale—by auction or otherwise—through a regular selling organization or exchange. Already in colonial times the commission or factor system had furnished the usual machinery for marketing plantation produce, flour, fish, lumber, and other local commodities. This existing sales organization, with ampler credit and wider business connections than early manufacturers possessed, naturally assumed the function of distributing their goods. Commission firms in fact promoted manufactures. They charged 2.5 per cent for

[103] Jerome, *History of the American Clock Business*, 45.

[104] *E.g.*, Nathaniel Stevens, *Bagnall Papers*, II, 1110.

[105] *American State Papers, Finance*, V, 787; Richard Borden sold the early products of the Fall River Iron Works from sloops to customers along the Hudson. For an account of flat-boat manufactories on the Mississippi, see Flint, *Recollections of the Last Ten Years*, 105.

handling goods, and 2.5 per cent for guaranteeing payments, but made additional profit as buyers of raw materials for factories and of merchandise for factory stores. Whatever the immediate system of selling adopted by the manufacturer, his ultimate market was reached through these distributors. They consigned his goods in small quantities to the retail stores of his own neighborhood, and shipped them in larger quantities to other wholesalers at New York and cities farther south. It was especially the already existing plantation trade that gave them the control of distant marketing.

Indeed, the rise of cotton manufacturing near Providence was determined by this earlier commerce and by the industries it supported. Cotton had long been a favorite material for candle-wicks. Most of that imported into England a century earlier was used for this purpose.[106] The mercantile predecessors of Almy and Brown, who financed the first successful cotton-mill in America, were makers of sperm candles at Newport. They traded with the West Indies in this article and other New England commodities, receiving in return cotton, which they gave out to be spun among families of their vicinity. Much of this was spun into the cotton wicking they used in their factory,[107] but a part was made into yarn, and after the Revolution woven on family hand-looms into coarse cloth for the plantation trade. The industry thus begun caused Samuel Slater to be called to Providence, and the first successful spinning mill in America to be erected in that vicinity.

Influences somewhat similar manifested themselves when our woolen mills began to supply more than neighborhood patronage. These mills, organized in intimate association with homespun industry, at first coöperated with rather than displaced the household spinning-wheel and loom. Therefore they did not, like cotton factories, receive their first incentive from a distant market. But at Peacedale, Canton, and other places in Rhode Island and Massachusetts, mills engaged exclusively in spinning cotton and wool from the Southern States, as well as foreign wool, into coarse yarns, which were woven into negro cloth for clothing slaves. Thus the commercial motive for Rhode Island textile manufactures in 1830 still remained in a degree the same as that for its rum distilleries a century before, and for those even cruder manufactures of staves, heading, and provisions that had supplied material for its earliest commerce.

One reason why American manufactures first competed with homespun industry was because their entry to the market supplied by European goods was blocked by other than economic obstacles. In spite of a patriotic propaganda of home industry, consumers persisted in preferring foreign manufactures. So late as 1816, when animosities

[106] *Report from the Committee Relating to Checked and Striped Linens*, Apr. 26, 1751, in Great Britain House of Commons, *Reports from Committees* (Reprint 1803), II, 295.

[107] Obediah Brown, *Manuscript Account Books*, 1756.

engendered by the recent war with Great Britain were still bitter, the Boston Manufacturing Company found difficulty in selling superior sheetings in Boston because they were domestic goods.[108] Even political controversies reflected themselves in market conditions. Federalist merchants boycotted American manufactures to show their hostility to the Government.[109] Preference for foreign fabrics was partly due to the influence of fashion; but the prejudice against our own wares often lacked even this basis.

A certain harmony existed between the early market demand and the industrial potentialities of America. Though our steel was still inferior to that made abroad, our charcoal-iron and bog-ore castings peculiarly suited frontier requirements. American textiles, excelling in durability those imported, possessed qualities demanded by frontiersmen and country settlers, who used the heavy shirtings, sheetings, jeans, kerseys, and satinets that formed the bulk of home consumption. So long as the occupation and development of new territory was the characteristic feature of our economic life, the domestic market expanded most rapidly in the field American factories could easily supply; and though the demand for finer goods increased with rising standards of living, the improvement of American manufactures kept pace with the more exacting requirements of consumers.

The pioneer spinners of Rhode Island furnished yarn to household looms and village weavers in their neighborhood and in adjoining States. Their control of this market was sufficient to enable them to maintain prices by tacit or formal trade agreements.[110] However, these agreements were among dealers rather than manufacturers. Country mills were unable to reduce marketing charges until after the War of 1812. Commissions and other expenses attending the first consignment of cotton goods from Fall River, in 1815, amounted to 23 per cent of the gross proceeds.[111] They were reduced to 5 per cent by employing a selling agent, who made periodical trips with goods to Boston. In 1816 the Waltham Company, following a precedent established by importers, began to sell cloth at auction. By this method commissions were reduced to 1 per cent. Later, periodical markets for American manufactures were held at different cities. One at Boston occurred semi-annually, under auspices of the New England Society for Encouraging Manufactures. Though all kinds of domestic goods, such as hats, umbrellas, lead pencils, glassware, and even "American olive oil," were offered, these were essentially cloth and shoe markets. Between 1826 and 1829 the number of parcels of cotton and woolen goods handled at a single session rose from 2000 to over 13,000; and within a few years the value of goods sold increased from $350,000 to nearly

[108] *Bagnall Papers*, III, 2324.
[109] Bagnall, *Textile Industries*, 603.
[110] Ware, *Industrial Revolution in the New England Cotton Industry*, 2–5, 64.
[111] *Bagnall Papers*, III, 1916.

$2,000,000. In 1832 the March sale of cotton and woolen goods alone amounted to $1,500,000; and boots and shoes to the value of $125,000 changed hands in a single day.[112] Similar markets were held monthly at Philadelphia. At the one in February 1826, purchasers were found for 700 pieces of goods.[113] Earlier reference had been made to the seasonal arrival at Philadelphia of New England shoe salesmen, who supplied local distributors to southern and western markets. In September 1826, an auction of 200 pieces of domestic cottons, flannels, and satinets was advertised at Providence.[113] Two years later 850 pieces of woolens, made near Baltimore, were similarly sold at the latter city.[114] About this time the annual turnover of domestic dry goods in Baltimore was valued at $5,000,000, and, with the addition of leather, metal, chemical, and glass manufactures, at $8,000,000. About $5,000,000 of the total was produced in Baltimore itself.[114] Similar auctions were held occasionally in the South.[115] A contemporary newspaper states that the sales of domestic goods in New York City were $387,631 in 1814, $726,165 in 1817, and $10,300,705 in 1830. Possibly these were public-auction figures, for the whole value of domestic goods sold in the city in 1830 was estimated at $15,000,000. The share of the home market held by our manufactures is suggested by the fact that in 1829 the excess sales of foreign over domestic goods at New York were $7,851,302. In 1830 this excess had fallen to $5,164,700.[116] In 1836 a short-lived "Cloth Hall" was set up at Providence. After the middle of the century Rhode Island calico printers sold their product at auctions held in New York at the commencement of each commercial season.[117]

Coincident with this development was the organization of a market for raw materials. Shortly before 1830 wool sales began at Boston, which were attended by manufacturers from New England and, at a later period, by sellers from as far west as Ohio.[118]

Although the quantity of textiles consumed per capita increased with cheapened production, no new field was opened for their employment sufficiently important to change radically the ratio of their volume to the population. Conditions were different with iron and steel. Steam navigation, steam-driven factories, the substitution of automatic machinery for hand tools, and finally the construction of railways, accompanied by cheaper processes of manufacture, raised our consumption per inhabitant from less than 5 pounds at the opening of

[112] *Niles' Register*, XXIX, 418, Feb. 25, 1826; XXXI, 116, Oct. 21, 1826; XXXV, 20, Sept. 6, 1828, quoting *Boston Daily Advertiser*, Aug. 28; XXXVI, 29, 67, Mar. 7, 28, 1829; XLII, 21, 79, Mar. 10, 31, 1832.

[113] *Niles' Register*, XXIX, 418, Feb. 25, 1826; XXXI, 116, Oct. 21, 1826.

[114] *Niles' Register*, XXXV, 103, Oct. 11, 1828; XXXVIII, 106, Apr. 3, 1830.

[115] *Niles' Register*, XXXVII, 178, Nov. 14, 1829, quoting *Savannah Mercury*.

[116] *Banner of the Constitution*, II, 262, July 13, 1831, quoting the *Providence American*.

[117] Ware, *Industrial Revolution in the New England Cotton Industry*, 255–258. Wallis, *Report on New York Industrial Exhibition of 1853*, 28.

[118] *Report on Wool and Manufactures of Wool*, *House Misc. Doc.*, 550, 50th Cong., 1st ss., lxvii; R. G. Hazard, *Manuscript Letter Book*, Dec. 22, 1828; *cf.* Villard, *John Brown*, 1800–1859, *A Biography Fifty Years Later*, 58-65; Franklin, *Life of John Brown*, 13–15; *Hunt's Merchants' Magazine*, XLIII, 499, Oct. 1860; Wright, *Wool Growing and the Tariff*, 74–75.

the century to nearly 120 pounds in 1860. These new influences first made themselves felt in the demand for steamboat machinery, and caused foundries and machine-shops to be established at eastern seaports and at the Great Lakes and river cities. New England afforded a market for factory equipment that helped to maintain and extend its earlier metal-working industries. Pioneer needs continued to manifest themselves in the prominence of nails, axes, hollow ware, stoves, and farm implements among reproductive manufactures. Railways, however, created the great iron demand of the middle century.

By 1825 American manufacturers had facilities for placing their products conveniently in all parts of the country. Domestic goods were quoted regularly in prices current from Boston to New Orleans and were standardized sufficiently to be ordered by conventional descriptions. Thereafter, the development of home markets was extensive rather than intensive. Its course was controlled by improved communication and growth of settlement rather than by fundamental changes of organization. A single generation had witnessed this advance from a dispersed and unorganized national market to systematic methods of distribution, controlled by adequate commercial machinery. Several forces coöperated to facilitate such a transition. Among them were the accessibility of the interior by waterways, internal improvements, a national tariff with free trade among the States, and the quickening of intercourse and the constant cementing of business relations by the migration of settlers from the Atlantic to the West. The long-established exchange of produce and manufactures between the North and South also assisted this development. To be sure, the neighborhood market alone still determined the existence of many minor and local industries that in the aggregate contributed much to the country's manufacturing product. But such industries had already ceased to be representative, and stood for a declining feature of our economic life. The significant relation of markets to manufactures was now national, and this exercised a transforming influence over the future growth, organization, and technique of American industry.

FOREIGN MARKETS AND AMERICAN MANUFACTURES

Foreign markets have had but occasional and subordinate effect upon our industrial development. Great Britain, by closing the West Indies to our commerce after the Revolution, curtailed the previous trade thither in furniture, lumber, flour, candles, ironware, and similar manufactures. Our exports of iron to Great Britain itself ceased for economic rather than political reasons. On the other hand, with the independence of the Spanish and Portuguese colonies and the legalizing of our trade with Cuba by the Spanish Government, wider markets were open to our products. The mills of Richmond annually

shipped from 60,000 to 70,000 barrels of flour to Brazil.[119] Spanish America took from us boots and shoes, tools and implements, furniture and vehicles, nails and hollow ware, and most of the older staples of colonial trade.[120] Goods found their way to northern Mexico by the overland route through Santa Fe. Between 1820 and 1840 annual caravans of 100 wagons or more, which set out from Missouri in June, carried merchandise to the value of $200,000 or $300,000 to this market. Mexican buyers occasionally visited Pittsburgh.[121] A few years later California afforded a market for canned goods, boots and shoes, and apparel, that greatly stimulated those industries, and in some instances directly affected their future organization.[122] A contraband trade with Canada sprang up as soon as the colonies attained independence. Between 1825 and 1850 shipments of manufactures thither continued to increase and offered one motive for the reciprocity treaty of 1854.[123] American manufactures were conveyed around the Cape of Good Hope in return for coffee, tea, and silk. As a rule, however, over-sea markets took our factory products only because of the convenience or exigencies of an already existing commerce in other commodities.

American manufacturers stood in a different relation to foreign markets than their European competitors. Abroad a distinction was made between manufactures for home use and for export. In England domestic consumption was supplied largely by goods made at different towns and of different materials from those intended for foreign buyers. The price of such goods precluded their extensive sale in many outside markets. But at Birmingham, Sheffield, Manchester, and Leeds, where manufacturers long had specialized for foreign consumers, every artifice was used to produce articles of seducing cheapness for the export trade. From those factories came cast iron cutleries, and flimsy but superficially attractive fabrics, designed expressly for foreign markets. They could be sold not only at low prices, but on long credits.[124]

On the other hand, American factories did not produce immediately for a foreign market. They sold abroad only their surplus stocks, or in order to profit by occasional opportunities out of the ordinary course of trade. The cloth they made was of materials and quality intended to maintain their reputation in the home market. American cotton

[119] *Hunt's Merchants' Magazine*, XX, 53, Jan. 1849.

[120] *E.g.*, *Niles' Register*, XL, 281, June 18, 1831; XLVIII, 365, July 25, 1835; *Hunt's Merchants' Magazine*, X, 576, June 1844; McLane, *Report on Manufactures*, I, 79, question 29; 87, question 29.

[121] *Niles' Register*, XXIX, 263, Dec. 24, 1825; XL, 344, July 16, 1831; XLIV, 374, Aug. 3, 1833; XLIX, 188, Nov. 21, 1835; LXI, 160, Nov. 6, 1841; *Hunt's Merchants' Magazine*, XI, 475, Nov. 1844; Gregg, *Pittsburgh, Her Advantageous Position*, back cover; *Sen. Doc.* 90, 22d Cong., 1st sess., Feb. 9, 1832.

[122] Banche Hazard, in *The Quarterly Journal of Economics*, XXVII, 257, Feb. 1913.

[123] La Rochefoucault, *Travels in North America*, I, 247; *cf. Niles' Register*, XXX, 143, Apr. 22, 1826; *Hunt's Merchants' Magazine*, X, 267, Mar. 1844; *American State Papers, Finance*, IV, 65, 74.

[124] Joshua Gilpin in McLane, *Report on Manufactures*, II, 852.

exports temporarily declined about 1840 because recent mechanical improvements enabled British spinners to substitute cheap, poor, short-staple East Indian cotton for American cotton in standard export fabrics.[125] When the high duty was imposed on wool, in 1828, a Rhode Island manufacturer experimentally imported woolen yarn from England to manufacture into negro cloth for southern buyers. But these yarns were so weighted with oil and so slack-twisted that cloth made from them, though of attractive finish, lacked durability and imperiled the manufacturer's reputation with purchasers.[126] American goods, therefore, designed primarily for home consumption, and at first exported casually to suit the convenience of an established commerce in other commodities, soon acquired a reputation for durability that gave them independent standing in foreign markets. This caused British manufacturers to imitate American brands and labels in order to profit by the reputation of their new competitors.[127]

American cottons entered foreign markets soon after the introduction of power-looms. In 1827 the value exported was about $1,000,000; thirty years later it had increased to $6,000,000. At the earlier date two-thirds of these exports went to Mexico and Chile; and Spanish America continued our best customer for these fabrics. They found a market also in China, the Levant, and even the East Indies, whence we previously had imported similar goods.[128] As early as 1827 Calcutta newspapers advertised American sheetings at 18 cents a yard; twenty years later Boston annually exported to the Indies 2,300,000 yards.[129] In 1829 a single Baltimore cargo to Chile and Peru included nearly $160,000 worth of cotton manufactures; in 1849 we sent 12,000,000 yards of cotton to the same market in exchange for copper.[130] The depression of this industry about 1850 was attributed partly to political disturbances in China, which curtailed our Asiatic sales.[131]

Railway development in the United States early made this country a large manufacturer of locomotives. Home demands were so extensive as to give our builders the experience and equipment needed to supply foreign markets. Before 1840 American manufacturers had furnished engines to Russia, Austria, Germany, and even to Great Britain. Of the first 145 locomotives built by William Norris of Phila-

[125] *Sen. Doc.* 21, 62d Cong., 1st sess., 483; *cf. id.*, 510.

[126] R. Hazard, *Manuscript Letter Book*, Nov. 8, 1830, Sept. 15, 1831.

[127] This practice prevailed in both countries with respect to the manufactures of the other. *Cf.* 550; *Niles' Register*, XIII, 32, Sept. 6, 1817; XV, 419, Jan. 30, 1819; XXIII, 257, Dec. 28, 1822; XXXII, 38, Mar. 17, 1827; XXXIV, 315, July 12, 1828; XLIII, 43, Sept. 15, 1832; *House Ex. Doc.* 2, 31st Cong., 1st sess., 791; *Hunt's Merchants' Magazine*, XXXVII, 764, 765, Dec. 1857.

[128] *Commerce and Navigation Reports; cf.* Woodbury, *Report on Cotton*, *House Doc.* 146, 24th Cong., 1st sess., 58, 67.

[129] *Niles' Register*, XXXIV, 156, May 3, 1828; XLI, 265, Dec. 10, 1831; *Hunt's Merchants' Magazine*, XX, 231, Feb. 1849; *Farmer and Mechanic*, II, 251, May 25, 1848.

[130] *Niles' Register*, XXXVI, 49, Mar. 21, 1829; *Reports of the Secretary of the Treasury*, VII, 732.

[131] Appleton, *Introduction of the Power Loom*, 31.

delphia, 41 were sold in Europe;[132] 10 of these went to the Birmingham and Gloucester Railway. American contractors built the railway from St. Petersburg to Moscow and an American firm supplied 162 locomotives and nearly 2700 freight and passenger cars for that line.[133]

American sugar mills had been sent to the West Indies even before the Revolution, and during the first half of the century sawmills, paper mills, and textile machinery were occasionally sent abroad. But metal-working had not yet attained the mechanical development that later enabled Americans, in spite of the high cost of labor, to compete successfully in foreign markets. One of the first industries to accomplish this was the manufacture of clocks. Connecticut mechanics had made wooden clocks for home markets since the beginning of the century; but these were not exported because the works warped at sea. Shortly before 1840 the substitution of brass works made it possible to ship abroad. Already this industry was so well organized mechanically in America that cost of production had been reduced to a point incredible to foreigners. The first consignment to England was bought by the British customs authorities, at the declared cost, under the belief that it was undervalued. Nevertheless, the price received returned a satisfactory profit to the Yankee manufacturer.[134] A large market was open almost immediately, not only in Europe, but in the Indies, China, and South America. Before 1843 a single firm had sold 40,000 clocks in foreign countries.[135]

Early statistics do not classify as manufactures lumber, flour, naval stores, candles, and some other articles now included in this definition. Manufactures, in the narrow sense then used, formed 5 per cent of our domestic exports at the opening of the century, 8 per cent twenty-five years later, and about 11 per cent in 1850. Between 1821 and 1860 per capita exports of manufactures rose in value from 28 cents to $1.60. Most of the increase occurred during the last decade of this period. Prior to 1860 we bought far more manufactures abroad than we exported; and none of our factory industries owed its origin or prosperity to foreign demand. The export market did not, as it did in England, modify the character of the goods our manufacturers produced or shape the technical developments of their undertakings.

[132] Norris Locomotive Works, *Circular and Testimonials.*
[133] *Hunt's Merchants' Magazine,* XXI, 132, July 1849.
[134] Jerome, *History of the American Clock Business,* 63–64.
[135] *Hunt's Merchants' Magazine,* IX, 485, Nov. 1843.

CHAPTER XV

CAPITAL, PROFITS, AND WAGES IN MANUFACTURES

Early commercial conditions affecting manufactures, 364. Sources of industrial capital, 367. Manufacturing profits, 372. Commercial crises, 378. Cost of production and prices, 385. Wages in America and England, 389. Administration and supply of labor, 397.

EARLY COMMERCIAL CONDITIONS AFFECTING MANUFACTURES

It is impossible to dissociate the various commercial influences affecting the growth of manufactures in America so as to present them in complete analysis. Capital and credit, commerce and markets, wages and prices, are too complexly interrelated to be isolated without losing individual aspects. The dominant force controlling the form all these influences assumed in their relation to each other, and in their separate and collective relation to manufactures, was the effect of undeveloped natural resources upon production. Unoccupied land drank up liquid capital as thirstily as a desert, and its call for labor was the primal command to human effort. To this fundamental economic need all other spheres of enterprise contributed. Mills, factories, and furnaces were themselves instruments of development. So long as they served more economically than other agencies the primary purpose of occupying and utilizing a new continent—whether by furnishing subsistence, shelter, and tools to its immediate exploiters or by turning into more profitable forms the products of that exploitation—they attracted credit and capital and commanded the coöperation of every other commercial help the nation afforded. When they exceeded this function, they met disaster. Within the limits thus defined factories earned profits comparing favorably with those of other enterprises in undeveloped countries and rapidly accumulated capital for their own extension. Their economies were those of large rather than refined production; their interest was to magnify nature and minimize man in the process of transforming material things. These conditions demanded a different equipment and organization from those of older countries, and adaptation to a different commercial environment.

After the establishment of the Republic the Government created a national coinage, and, with the restoration of Federal and State credit, it was able to erect a banking system whose circulation not only added to the supply of currency but provided this in a form not likely to be

lost to foreign creditors. During the Napoleonic wars an active carrying trade and large sales of produce to Europe and the West Indies replenished the nation's stock of specie. Never again was the want of a circulating medium so seriously to embarrass commerce and industry as during the colonial period.

The Revolution wrecked most of the old commercial houses. Many of their proprietors were loyalists, and those who were patriots suffered in fortune during that troubled period. After the war American trade was restored by a new generation of merchants, who at first were little more than agents for British firms.[1] However, the subsequent revival of foreign commerce enabled many of these men to acquire independent fortunes; and within less than a generation from our peace with England the commercial capital of America was far greater in proportion to the population than ever before. In respect both to currency and capital, therefore, conditions were more favorable to new undertakings than at any time under British sovereignty.

Nevertheless the machinery of credit and exchange was still rudimentary and only laboriously kept pace with the business demands of the country. Barter prevailed even in the larger circles of domestic commerce. Cargoes of western iron or cordage were traded directly for cargoes of logwood, cotton, and sugar at New Orleans.[2] New England manufacturers exchanged cloth with Boston and Providence merchants for wool and cotton.[3] In the narrower circles of retail trade, barter was still universal. Mills paid their operatives with store orders or with cloth or iron. Even orders on stores not owned by manufacturers were payable usually in factory products.[4] In fact, general dependence on barter was one reason, though of course not the sole one, for the early prevalence of the truck system in dealings between employers and workmen. The factories at Waltham and Lowell, organized after the second war with England, were probably the first to pay employees regularly in money.[5]

Long credits characterized business operations. Cash transactions were so rare as to be negligible. In the South terms of payment usually ran from crop to crop, and even in the North they approximated this period. Almy and Brown sold yarn from the Slater mills on three to nine months' payment, according to the individual standing and importance of creditors.[6] This was partly the continuance of a custom established in colonial days, when local mercantile transactions were

[1] La Rochefoucault, *Travels in North America*, II, 581, *et seq.*

[2] *E.g.*, James Weir, *Manuscript Letter Book*, I, May 27, 1813; Mar. 25, 1815; *id.*, II, 173; Christian Wilts, *Manuscript Letter Book, passim.*

[3] Bagnall, *Textile Industries*, 197, 602; Almy & Brown, *Manuscript Letter Book*, Mar. 26, 1810; Ware, *Industrial Revolution in the New England Cotton Industry*, 167.

[4] *Documentary History of American Industrial Society*, V, 25, 27, 50; *American State Papers, Finance*, V, 810; *American Wool and Cotton Reporter*, XIV, 1454; McLane, *Report on Manufactures*, II, 808.

[5] *Bagnall Papers*, III, 2009.

[6] *E.g.*, Almy & Brown, *Manuscript Letter Book*, 1803, *passim;* Cushing, *New Hampshire Iron Company*, 7.

governed by the time required to receive goods and make remittances to England, and partly it was due to slow communication, a generally torpid condition of exchange, and lack of an adequate circulating medium.

These features of commercial life checked investment in new manufacturing enterprises. An accumulation of capital in kind was not a convenient asset for constructing a factory and beginning its operations. Manufacturers could not draw against current accounts to meet mercantile requirements, and were forced to carry much dead capital locked up in stock and materials. On account of the competition of foreign buyers, cotton, wool, and similar commodities always moved quickly for cash or early payments, while the goods made from them sold on longer time.[7] In 1849 southern staples commanded immediate returns, while northern manufactures sold on six to ten months' credit.[8] Therefore it was difficult for early factory-owners to procure materials without ready money, although it was impossible to dispose of goods for cash. The Hartford Manufactory Company bought unsatisfactory foreign wool from importers on credit rather than better wool from local producers on immediate payment, because it could sell its woolens only in slow markets or under risky auction conditions.[9] When the Boston Manufacturing Company was formed, the organizers petitioned the legislature for a charter including banking privileges, on the ground that their British competitors used private banks to make capital productive when not employed in manufacturing and to increase available funds in case of need.[10] Otherwise part of the capital of a manufacturing company at times was necessarily idle, and at other times might be insufficient for immediate demands. The petition was denied, but between 1815 and 1830, in New England and the Central States, banking facilities became adequate to the requirements of manufactures. Elsewhere conditions were not so satisfactory. It was pointed out in 1856 that southern mills drew no profit from their accessibility to local markets because, though they paid cash for cotton, neighboring banks would not accept their bills or drafts for the cloth they sold to local merchants. It resulted that the goods they made were shipped to New York or other northern cities, where cloth consignments were the basis of negotiable banking paper.[11]

[7] However, references to six months' credit on cotton appear in Almy & Brown, *Manuscript Letter Book; e.g.*, Letters to Eliza Waring, 1809; *cf.* Reuss, *Calculations and Statements*, 106; McLane, *Report on Manufactures*, I, 935, question 6.

[8] A. A. Lawrence, in *Hunt's Merchants' Magazine*, XXI, 628–630, Dec. 1849.

[9] Letter of Elisha Colt, Aug. 20, 1791; *Hamilton Papers*, in Library of Congress; *cf. Massachusetts Agricultural Repository and Journal*, IV, 65, 66, quoted in Wright, *Wool Growing and the Tariff*, 65.

[10] *Bagnall Papers*, III, 1977.

[11] *De Bow's Review*, XX, 744, June 1856.

SOURCES OF INDUSTRIAL CAPITAL

At the time our early factories were established there were few large private fortunes in America and little inherited wealth. The savings of the people were largely in the hands of those who had made them by their own exertions and who guarded them with corresponding caution.[12] Foreign commerce and privateering had fostered a spirit of speculation and adventure in one quarter, but this was limited to a small part of the people. The few who possessed surplus incomes sought conservative investments in their own neighborhood. This partly explains why agriculture attracted capital when profits were only 3 or 4 per cent and why money could be procured on mortgages at 5 per cent, although mercantile profits were high and rewards of capital in speculative undertakings were excessive.[13]

Manufacturing operatives, owners of small shops and water mills, invested their accumulations in extending their business, and thus became the founders of large enterprises. This was the history of many small cotton and woolen mills and forges in New England, New York, and Pennsylvania. Sometimes these mechanics associated with themselves farmers and neighbors, who contributed land and mill-sites and often personal labor to these undertakings. From such partnerships or associations arose the early stock companies, which later developed into the small corporations so characteristic of New England. These companies occasionally, in their articles of organization, agreed to add all their earnings for a period of years to their original investment.[14]

Commerce afforded another, and in some respects a more important source of capital. Almy and Brown, who founded the cotton industry in America, were prominent examples of such manufacturing merchants. In 1808 John Waterman erected a cotton mill at Canton, Massachusetts, with capital provided by a Boston wholesale merchant, who took its product, paying a stipulated price for manufacturing.[15] This movement of capital from commerce to industry, of which there were several other early examples, was slow until the interruption of foreign trade during the War of 1812. Then it was much accelerated. In the same way that Glasgow merchants, when commerce with America declined during the Revolution, turned their attention to extending the cotton and iron manufacture of their country,[16] so New England merchants, like the Appletons and Lowells, during the second war with England, promoted the great manufacturing corporations that from that time forth added a distinctive feature to New England industry.[17]

[12] *Cf.* G. S. Callender, in La Follette, *The Making of America*, III, 39.

[13] McLane, *Report on Manufactures*, I, 69, 81, 682, 942; Bagnall, *Textile Industries*, 184; Clay, *Works*, I, 419 (speech of 1820).

[14] *E.g.*, *Bagnall Papers*, II, 987–990 (Rivulet Manufacturing Co.).

[15] *Bagnall Papers*, II, 1436; *cf. American Wool and Cotton Reporter*, XIII, 1126, 1550.

[16] Mantoux, *La Revolution Industrielle*, 233.

[17] *Bagnall Papers*, III, 2229–2231, 2319; *Hunt's Merchants' Magazine*, XVIII, 361, Apr. 1848; *cf. Minutes of Evidence, Orders in Council*, 449–450, in Great Britain, *Parliamentary Papers*, 1812, III.

When the carrying trade refused to revive at the close of the war, discouraged New England ship-owners and sea-captains took to cotton manufacturing at Fall River and in Rhode Island. In 1819, when the prospects of the latter industry were "dark and gloomy," the directors of one Massachusetts corporation formally instructed their manager to "veer and bear away" from impending dangers.[18] As the East Indian trade waned, partly on account of increased production of cotton fabrics in New England, Salem and Providence capital sought investment in industrial enterprises.[19] So late as 1847 the decline of the whaling industry caused capital again to be diverted to manufacturing in Rhode Island,[20] much as a similar crisis in Pacific whaling, at a later date, stimulated the sugar industry in Hawaii. A characteristic of companies formed by manufacturing operatives, farmers, and other small investors was the close control the founders retained over the industrial affairs of the corporation and their frequent service as members of its working force. On the other hand, promoters of companies organized with commercial capital more usually confined their direct participation to the mercantile side of the business.

Commerce supplied capital to manufactures in two ways: by direct investment and by credits to industrial companies. The latter way, though less conspicuous, was probably the more important of the two. Mercantile enterprise not only supported the larger factories of the East, but directly and indirectly sustained many smaller undertakings throughout the interior. We have seen already how Philadelphia merchants promoted lead works, ship yards, and cordage factories in the Ohio and Mississippi Valleys. As early as 1816 the Hope distillery, at Louisville, was established with New England capital.[21] Money also flowed from coal mining into iron manufacturing.[22] From the same district, at a later period, but not entirely from commercial sources, came the money to build cotton factories in Alabama and Georgia.[23] However, southern mills were for the most part erected with local capital. In cities like Richmond, Petersburg, and Augusta companies were promoted by merchants and bankers; but planters built some of the earliest factories.[24] John C. Calhoun founded one such enterprise.[25] In 1845 it was estimated that cotton-planting in the Carolinas did not return more than 3 or 4 per cent upon money invested; hence the reputed profits of northern manufacturers were alluring.[26]

[18] *Bagnall Papers*, III, 1921 (Fall River Co.).

[19] *Niles' Register*, XXIX, 23, Sept. 10, 1825; XXIX, 420, Feb. 25, 1826; *cf.* also *Boston Newsletter*, Oct. 14, 25, 1826.

[20] *Bagnall Papers*, II, 1447–1448.

[21] McMurtrie, *Sketches of Louisville*, 127.

[22] Hunter, *Iron Industry at Pittsburgh*, 338–345; Bruce, *Iron Industry in Virginia*, Chap. III.

[23] *E.g.*, *Niles' Register*, XXVII, 352, Jan. 29, 1825; American Historical Association, *Report*, 1889, II, 396; *Sen. Doc.* 72, 62d Cong., 1st sess., Part III, 1873.

[24] *Niles' Register*, XLV, 83, Oct. 5, 1833; *cf.* 556–557; also Appendix XI.

[25] R. Hazard, *Manuscript Letter Book*, Aug. 23, Nov. 30, 1830; letter to J. C. Calhoun, Jan. 30, 1834, in American Historical Association, *Report*, 1899, II, 331.

[26] Gregg, *Domestic Industry*, 18.

Industrial capital, however, has been its own chief progenitor. The high profits normally enjoyed by manufacturers supplied a surplus for new enterprises and created confidence in their success. In 1831 Massachusetts money sought manufacturing investments freely on the prospect of 6 per cent returns.[27] In 1849 the annual factory dividends of that State were estimated at $3,000,000.[28] Fall River mills were owned by local residents whose capital had been derived from spinning and weaving.[29] Employees invested their savings in industries with which they were familiar. In 1845 operatives of the Merrimac Company owned $60,000 of its stock.[30] Savings banks and insurance companies accumulated petty contributions from thousands whose incomes came from manufacturing and turned them back to industrial undertakings.[31]

Census figures do not record with precision capital invested in manufactures, because the successive enumerations were not of equal accuracy and completeness, and because they did not employ uniform or consistent classifications. They suggest that this capital was about $50,000,000 in 1820, $250,000,000 in 1840, $500,000,000 in 1850, and $1,000,000,000 in 1860. Therefore it is reasonable to assume that after 1820 the nation's investment in manufactures doubled every decade, and it is not unlikely that a similar ratio of progress prevailed earlier in the century. However, this rapid growth of capital did not protect manufacturers from those money stringencies which characterize new countries. After the War of 1812, when other means to promote manufacturing than the tariff were under discussion, attention was drawn mainly to the difficulty of procuring capital for their support. "Some thought it would be best for the Government to establish manufacturers and carry them on at public expense by managers and superintendents to be appointed by the Executive."[32] The Secretary of the Treasury suggested the expedient of a Government circulating capital, to be loaned without interest to manufacturers and to be repaid by them as conditions admitted.[33] Military rather than industrial motives caused the War Department to make large money advances on contracts with private manufacturers, to help these build and equip factories for firearms, and indirectly other metal-working trades received timely encouragement from this support.[34] During the depression of the woolen industry, between 1816 and 1824, factory-owners could not get capital to improve their machinery. As this was

[27] *Niles' Register*, XL, 281, June 18, 1831.
[28] *Farmer and Mechanic*, I, 455, Sept. 21, 1848.
[29] Peck and Earl, *Fall River and Its Industries*, 66–68.
[30] Gregg, *Domestic Industry*, 16; *Reports of the Secretary of the Treasury*, VII, 13.
[31] *Niles' Register*, LX, 416, Aug. 28, 1841; Ayer, *Uses and Abuses in the Management of Manufacturing Corporations*, 16–17.
[32] Quoted from the *Aurora* (undated), in *Carey Clippings*, VI, 281.
[33] *American State Papers, Finance*, II, 430, 431.
[34] North, *Simeon North*, 48, 51.

a time of rapid technical development, they were unable to manufacture as cheaply as their competitors for this reason.[35] Again, after 1824, when business revived, many were obliged to mortgage mills and machinery for money to buy wool.[36] During the temporary but extreme price depressions that characterized this period, American manufacturers lacked financial resources to hold their finished product for better quotations, and many promising undertakings failed for this reason.[37]

Early manufacturing was conducted "with much of the looseness incident to our agricultural pursuits."[38] Scanty capital forced many factory-owners to put up with poorly constructed machinery that required continual attention and repairs. Even the equipment of plants well financed and designed was quickly superseded by improvements that afforded economies beyond the cost of replacement. In 1832 the garrets and outhouses of most factories were said to be crowded with machinery discarded for this reason.[38] One manufacturer estimated that rapid depreciation due to new inventions, combined with commercial and tariff uncertainties, made it necessary for a factory to return its cost to the owner every few years.[39]

Notwithstanding these discouragements, money was always attracted to manufacturing investments. Many hopes of high profits, based on the success of exceptional undertakings, proved illusory. But new inventions that depreciated the investments of some manufacturers proved a bonanza to others. The Middlesex Company realized a profit of 33 per cent yearly from the Crompton looms, while each of the automatic carpet looms, introduced by the Lowell Company, earned its owners annually $1000.[40] But the growth of industrial capital was due mainly to conservative influences. Small enterprises, catering to local markets and managed directly by their proprietors, probably afforded as safe employment for money as any other sphere of production. These undertakings were subject to losses by fire and flood, against which they were not insured so generally as at present. Foreign wars, foreign and domestic commercial crises, and the alternate activity and stagnation of the home market, caused wide fluctuations in prices of raw materials and finished goods. The protective tariff was the center of bitter controversies and seldom the subject of a consistent program. Insecurity hovered over the currency, and especially over bank bills and credits. Periods of abnormal inflation and contraction succeeded each other. But all these conditions affected every class of investments. Commercial capital was as

[35] Stanwood, *American Tariff Controversies*, I, 171.
[36] *House Misc. Doc.* 550, 50th Cong., 1st sess., lviii.
[37] Holmes, *Account of the United States*, 197–198.
[38] McLane, *Report on Manufactures*, I, 80.
[39] McLane, *Report on Manufactures*, I, 934; *cf.*, however, 70, question 13; 74, question 13.
[40] *Bagnall Papers*, IV, 2525, 2573; *cf. American Wool and Cotton Reporter*, XIV, 1042.

insecure and agricultural profits were almost as uncertain as those of factories. The speculative risks which attended business at this time, greater probably than ever again in our history, were a common condition of all undertakings and did not deter from one field of investment more than from another.

Although capital was less abundant in America than in Europe, industry tended to organize on a capitalistic basis. The large domestic market for standard goods, the incentive to economize labor, and the capacity of the people to coöperate in big enterprises favored large manufacturing establishments that combined all processes of production under central control. Such a system demanded greater single investments than were required in Europe, where the different processes of an industry were conducted independently by small manufacturers who specialized in particular operations.[41] This highly organized and centrally administered method of manufacturing was facilitated by the extension of corporate management.

The technical progress of the cotton industry caused plant investments to increase; but on account of the greater expedition with which raw materials were worked into cloth and the product sold, the amount of necessary operating capital was reduced. In 1831 it was estimated that early New England manufacturers had employed "capital independent of mill and machinery at least tenfold what is now required."[42] The present tendency for manufacturing investments to increase faster than the annual value of product probably did not appear until after 1860, though early statistics are so fragmentary and inaccurate that conclusions based upon them are conjectural. Data from returns made by a selected list of cotton mills in nearly full operation during 1820 indicate that their annual product was then about 60 per cent of the capital invested. Massachusetts returns in 1837 give the product as 91 per cent of the capital, and eight years later as 69 per cent. The Federal census of manufactures made this ratio 97 per cent in 1840, 83 per cent in 1850, and 115 per cent in 1860.

In case of woolens, the greater cost of raw materials caused product to bear a higher ratio to capital. In 1820, a selected list of establishments produced manufactures equal in value to 99 per cent of their investment; in 1832 this figure in Connecticut was 109 per cent; in 1837 the Massachusetts ratio was 180 per cent, but it fell in 1845 to 159 per cent. During these eight years the wool manufacture of that State made slow progress and much machinery was idle. According to the Federal census the woolen mills of the whole United States produced 131 per cent of the value of their investment in 1840, 153 per cent in 1850, and 201 per cent in 1860. Such figures are naturally affected by different definitions of capital and by the greater completeness of succeeding enumerations. They were modified by the varying

[41] *Cf.* Wyckoff, *Silk Goods in America*, 30.
[42] McLane, *Report on Manufactures*, I, 173.

prosperity of industry and by the changing price of raw materials. Technical improvements may have enabled textile machinery to turn out a larger product in proportion to its cost. But value of output increased faster than investment also in the manufacture of iron, cordage, paper, glass, and leather; and notably in case of flour and lumber mills. Moreover such figures as we have suggest that manufactures were more highly capitalized in proportion to product in the northeastern States, where money and credit were comparatively abundant and the people were largely engaged in industrial pursuits, than in the West and South.

MANUFACTURING PROFITS

In reviewing the history of the cotton industry, in 1831, Samuel Slater said that most manufacturers worked in their factories and that, after deducting ordinary interest on their investment and their own wages, their profits would be very small. Manufacturers of this class seldom failed, because their losses fell on all three items—profits, interest, and wages. Mechanics operating mills with borrowed capital failed occasionally, but even these were more usually successful than those who invested in such enterprises without giving them their personal superintendence, skill, and labor.[43] This generalization applied particularly to the small spinning mills and similar enterprises so numerous in New England and the Central States during the first third of the century. Although the large companies financed by Boston capital at Waltham and Lowell attained spectacular success, these small manufacturers, with resources hardly exceeding those needed to run a farm, more truly represented American industry. As investors they resembled the farmers from whom many were descended. Like these, they were at the same time laborers and capitalists, whose savings guaranteed them regular employment and self-direction, and who reckoned this security and independence among the elements of gain from their investment.

Mercantile profits also were closely associated with industrial earnings. Manufacturers continued otherwise unprofitable undertakings because of the merchandise business they transacted in connection with them. Iron-masters and mill owners operated farms, flour mills, and stores, and paid their workmen in goods. Store profits were included in dividends, and a store might be a contributory motive for a factory.[44]

Dividend statements do not record losses of manufacturing investments during depressions, or gains during periods of prosperity. Profits are rated sometimes on capital reduced from the amount originally paid in, and sometimes on capital increased by reinvestment of earnings

[43] McLane, *Report on Manufactures*, I, 928, 929.

[44] McLane, *Report on Manufactures*, II, 669; *American State Papers, Finance*, V, 788, 790; *cf.*, however, Cushing, *New Hampshire Iron Company*, 27.

and stock dividends to shareholders. Without any reported change in physical condition, the property of the Blackstone Manufacturing Company was valued in 1813 at $216,000, the following year at $340,000, and in 1815 at $193,750.[45] Shares of the Globe Mills, at Fall River, purchased for $60 in December 1815, sold the following November for $175, and in 1822 for less than $60.[46] Capitals of a million dollars or over were sometimes entirely wiped out by a few years of unsuccessful operation. Probably the woolen and iron industries suffered most from such fluctuations of prosperity. It was estimated in 1832 that all the money up to that time invested in American woolen mills had been lost to the original owners.[47] Perhaps this was overstated, but the condition of iron manufactures in eastern Pennsylvania between 1840 and 1850 shows how unstable were the bases of industrial prosperity. Of the works in that part of the State, during these ten years nearly one-third, or 120 out of 364, passed through the sheriff's hands. Charcoal and anthracite furnaces and forges, modern plants and old, alike suffered during that crisis.[48] This was the district where foreign competition was felt, and these conditions were not representative of the whole country. But they affected what was then our most important iron-producing region. In contrast with this, the Fall River iron works, which combined the manufacture of iron and nails with that of cotton prints, within twenty-four years of their establishment, besides paying large dividends, raised their investment by undivided profits from $24,000 to $1,460,000. Between 1840 and 1850 a subsidiary company, the American Print Works, in addition to plant extensions and heavy dividends, invested $200,000 in a steamboat line between Fall River and New York, and divided this amount as a bonus among its shareholders.[49]

In spite of Government assistance, the first factory of woolen at Hartford and of cotton at Beverly lost money for their promoters. A company manufacturing sailcloth at Boston, in 1791, did not earn 1 per cent profit above the bounty received from the State;[50] but at the same time Connecticut linen manufacturers, making osnaburgs, canvas, thread, and stockings, partly for the Southern States and West Indies, reported a profit of 10 to 25 per cent.[51] No exact record exists of manufacturing earnings between the date of Hamilton's report and the War of 1812, but they were sufficient to encourage a moderate growth of industry. Between 1809 and 1826 the average dividends of the Lippitt mills in Rhode Island were 10 per cent.[52] The profits of the Pawtucket

[45] Bagnall, *Textile Industries*, 530–531.
[46] *Bagnall Papers*, III, 1868.
[47] McLane, *Report on Manufactures*, I, 68.
[48] *Documents Relating to Manufacture of Iron*, Appendix; *cf.* Bruce, *Rise of the Iron Industry in Virginia*, Chap. III.
[49] Fenner, *History of Fall River*, 75; *Bagnall Papers*, III, 1768.
[50] Account Boston Sail Cloth Manufactory, *Hamilton Papers*, in Library of Congress.
[51] Statement of Jonathan Burr, *Hamilton Papers*, in Library of Congress.
[52] *Bagnall Papers*, II, 1367.

Cotton Manufacturing Company from 1805 to 1815, allowing for depreciation at the close of the war, when business was suspended, amounted to 5.5 per cent per annum. During the ten years prior to 1829 they averaged 10.5 per cent. In 1829 there were severe losses, followed the next three years by annual earnings of 13.33 per cent.[53] In one year during the war the Pomfret Company earned a dividend of $36,000 on a capital stock of $60,000; and it passed through the panics of 1816, 1829, and 1837 unembarrassed.[54]

In 1831 a New England manufacturer testified that, partly on account of favorable purchases of cotton on an advancing market, his mill paid 20 to 30 per cent during the War of 1812, that for two years thereafter it was shut down entirely, but subsequently had earned from 6 to 8 per cent.[55] Between 1812 and 1820 another Rhode Island cotton manufacturing company paid no dividends but doubled its capital from profits, and between 1820 and 1832 cleared 9 per cent annually on this increased investment.[55] The Union Manufacturing Company of Baltimore, with a paid-in capital of $400,000, earned 6.75 per cent in 1813, 9.25 per cent in 1814, and 8.25 per cent in 1815.[56]

Early cotton manufacturers acquired comfortable fortunes. James Beaumont, an English spinner who came to America in 1801, retired in middle life with a competence.[56] The fortune of Samuel Slater, who arrived in America without funds, was inventoried in the midst of the crisis of 1829 at over $690,000.[57] Between 1816 and 1818 the Fall River manufactory earned profits of 20 per cent per annum.[58] During the first ten years of its operation, ending with 1826, the Boston Manufacturing Company averaged 18.75 per cent, due in part to the advantage of the power-loom.[58] As early as 1825 Waltham and Merrimac shares were 40 per cent above par.[59]

Most of the Lowell companies earned high profits. From the date of organization until 1860 the dividends of the Merrimac Company averaged over 12 per cent per annum. The Appleton Company though it began operation in the midst of the crisis of 1829, paid a dividend of 3 per cent at the close of the first year, 14.5 per cent for the first three years, and an average of 8 per cent for fifty years thereafter.[60] The early earnings of the Hamilton Company exceeded 1 per cent per month, and six months' profit of one of its mills paid the entire cost of erecting its print works.[61] According to a statement published in 1845, dividends of six Lowell companies since their establishment had been

[53] McLane, *Report on Manufactures*, I, 172.
[54] *American Wool and Cotton Reporter*, XIV, 822.
[55] McLane, *Report on Manufactures*, I, 941; 953.
[56] Bagnall, *Textile Industries*, 275; 494.
[57] White, *Slater*, 215 (note).
[58] *Bagnall Papers*, III, 1920; 2016.
[59] *Niles' Register*, XXIX, 260, Dec. 24, 1825.
[60] *American Wool and Cotton Reporter*, XV, 1042.
[61] *Bagnall Papers*, III, 2251, 2252, 2276, 2277.

from 9 to 14 per cent, and those of three younger companies were from 5.25 to 7 per cent.[62] The average dividends of all the Lowell factories during the six years ending with 1830 were 7.6 per cent. During the following three decades they were respectively 12.3, 9.6, and 10.5 per cent. During the ten years ending with 1860 the average profits of all the companies were materially modified by the high earnings of the Lowell Carpet Company, those of the other mills hardly exceeding 6 per cent.[63]

Small establishments at times earned exceptionally high profits. The Masonville Company in Connecticut earned 50 per cent annually on its capital of $40,000 during the five years ending with 1831.[64] Two years later Holder Borden, printing cotton in a rented mill at Tiverton, cleared $30,000 the first season. Naturally these earnings were not representative. In 1832 several New England mill-owners testified that their returns for a series of years did not exceed 6 per cent. But profit sometimes was interpreted to mean only gains in excess of legal interest.[65] It was estimated that cotton manufacturing paid in New York State about 7 per cent, in Delaware 10 to 12 per cent, and in Pennsylvania 8 to 15 per cent.[65] Joint-stock companies in Ohio earned 12½ per cent, while mills operated by their owners paid 25 per cent.[65] In 1839, of two factories at Petersburg, Virginia, one declared dividends of 16 per cent and the other of 18 per cent.[66]

Testimony gathered in connection with the Walker tariff report of 1846, though too fragmentary to justify general conclusions, indicates that earnings varied widely in different establishments and localities. Some manufacturers stated that they were losing money, others that they were earning from 20 to 25 per cent. Small southern mills reported high profits, but these may have included the wage of owners. Those in North Carolina were earning 14 per cent, and those in Georgia 20 per cent and over.[67] An account of the dividends paid by 24 New England textile companies during the eleven years ending with 1849, indicates that they averaged 10 per cent per annum upon an aggregate nominal capital exceeding $20,000,000. Three other mills, of which two had been established recently, with a nominal capital of $3,500,000, as yet had declared no dividends. Stock dividends of $615,000 were not included in this statement. The highest average profits, 14 per cent yearly, were earned by the Merrimac Company, the largest corporation reporting, and the next highest 11.5 per cent, were earned by the smallest of these companies.[68] From 1846 to 1850 the cotton

[62] *Hunt's Merchants' Magazine*, XVI, 362, Apr. 1847.
[63] *American Wool and Cotton Reporter*, XV, 1042.
[64] *Bagnall Papers*, II, 1548.
[65] McLane, *Report on Manufactures*, I, 76, 81, 941, 942 (profit defined); *id.*, II, 462, question 6; 4, 212; II, 860, 867; *cf.* Appendix X.
[66] *Niles' Register*, LVI, 368, Aug. 3, 1839.
[67] *Sen. Doc.* 72, 63d Cong., 1st sess., Part III, 1840, 1869, 1870, 1871, 1872.
[68] A. Lawrence in *Hunt's Merchants' Magazine*, XXI, 632 ,Dec. 1839.

mills controlled by Boston capitalists averaged 14 per cent profits.[69] In 1853, of 40 New England manufacturing corporations, not all of which were textile, 36 declared dividends ranging from 4 to 10 per cent.[70] In 1855, of 40 textile and textile-machinery companies in the same State, 12 passed dividends.[71] The following year, of 41 companies, 10 passed dividends.[72] Others paid from 3 to 11 per cent. About this time the York Manufacturing Company, at Saco, Maine, was paying over 20 per cent per annum and earning a surplus in addition.[73] On the other hand, during the decade ending with 1860, the Boston Manufacturing Company, formerly so profitable, earned barely 6 per cent.[74]

During the War of 1812 woolen manufacturers made high profits, the memory of which assisted the revival of this industry after the prostration succeeding that event. Dividend records from this period are rare, because mills were small and owned by individuals or partners. In 1820 Ohio carding mills made about 15 per cent profit.[75] In 1828 woolen manufacturers testified that they recently had been losing money.[76] Between 1827 and 1831 the net earnings of a mill in western Pennsylvania averaged about 15.5 per cent.[77] Estimates published in 1832 gave the average profits of woolen factories of Maine at that time as 12 and 14 per cent, and those of Delaware as 12 per cent between 1815 and 1824, 8 per cent between 1824 and 1828, and 6 per cent for the following three years.[77] Flannel and satinet manufacturing were the most prosperous branches of this industry. In 1816 Nathaniel Stevens of Andover, is said to have cleared a net profit of $5 on every piece of flannel made at his mills.[78] In 1831 George Kuhn and his associates at Framingham made a net profit of $19,685.10 on 7700 pieces of flannel selling at an average of $12.47 each, or more than 20 per cent on their gross sales. Abraham Marland in 1822 leased a factory for twenty years at a rental of 9 per cent of its cost. He bought the factory from its owner six years later, and his mills are said to have earned 25 per cent on the investment they represented year after year [79]

Some satinet factories made tremendous dividends. The Springfield Company in Connecticut averaged 87.5 per cent for the three years from 1835 to 1837.[80] Between 1829 and 1837 the Rock Manufacturing

[69] DeBow, *Industrial Resources*, II, 129.
[70] *Hunt's Merchants' Magazine*, XXX, 515, Apr. 1854.
[71] *Hunt's Merchants' Magazine*, XXXIV, 259, Feb. 1856.
[72] *Hunt's Merchants' Magazine*, XXXVI, 384, Mar. 1857.
[73] *Bagnall Papers*, III, 2397. Between 1831 and 1845, the average dividend had been 9.5 per cent, *Sen. Doc.* 72, 62d Cong., 1st sess., Part III, 1688.
[74] Boston Manufacturing Co., *Manuscript Annual Reports.*
[75] *American State Papers, Finance*, IV, 192.
[76] *American State Papers, Finance*, V, 808, 812, 815, 820, 822.
[77] McLane, *Report on Manufactures*, II, 467; I, 5, 6; II, 672; *cf.*, however, *id.*, II, 661.
[78] *Bagnall Papers*, II, 1111.
[79] *American Wool and Cotton Reporter*, XIV, 424; Bagnall, Textile Industries, 341; North, "New England Wool Manufacture," in *The New England States*, 209.
[80] *Bagnall Papers*, II, 1247.

Company in the same State averaged over 31 per cent annual profits.[81] Satinet factories in Maine returned 15 to 20 per cent to their owners.[82] In 1830 Thomas Hazard, operating two very small factories in Rhode Island, was clearing from them between $200 and $300 weekly.[83] The New England Company, which went into operation just after the panic of 1837, paid 140 per cent dividends on its original investment during the next ten years.[84]

Individual manufacturers, in spite of temporary reverses, made comfortable fortunes. Thomas Barrows, starting in 1820 with little or no capital, accumulated a fortune of $500,000 during the next thirty years. Of the larger companies, the Middlesex Mills at Lowell averaged 16 per cent dividends from the date of their establishment in 1830 until 1860.[85] According to the Walker report in 1845, some woolen mills in New England and New York were earning from 7 to 15 per cent.[86] Subsequently this industry suffered from the high duty on imported wool. Capital was withdrawn and the product in some instances declined. Nevertheless, though the earlier rate of progress was checked, many companies continued to earn dividends occasionally as high as 10 per cent.

Until the close of the War of 1812, eastern ironmakers were very prosperous, and single furnaces with comparatively small capital cleared $20,000 a year for their owners.[87] After the war foreign competition reduced or abolished this profit, especially upon bar iron.[88] In 1820, six Pennsylvania foundries, engaged in making castings, then the most profitable branch of this industry, reported profits of about 6 per cent.[89] Ten years later an Albany stove-founder was making 10 per cent per annum.[90] Reliable figures showing the earnings of ore furnaces are unobtainable, partly because of the vicissitudes these enterprises then encountered. In 1832 those in New Hampshire and Connecticut were reported to pay 16 per cent; in New York, 18 per cent; and in Ohio, 20 per cent.[90] Iron works at Wilmington were said to be still more profitable.[91] According to the Walker report, the earnings of foundries and machine-shops ranged from 10 to 25 per cent.[92] During the boom years following 1850 some iron works are said to have earned their cost in a single year, and the dividends of the Hudson

[81] *Bagnall Papers*, IV, 2606.
[82] McLane, *Report on Manufactures*, I, 23.
[83] R. Hazard, *Manuscript Letter Book*, Dec. 15, 1830.
[84] *Bagnall Papers*, IV, 2615.
[85] However, between 1850 and 1860, dividends were under 4 per cent; *American Wool and Cotton Reporter*, XV, 1042.
[86] *Sen. Doc.* 72, 62d Cong., 1st sess., Part III, 1713, 1717, 1748, 1759, 1773, 1775.
[87] *Sen. Doc.* 67, 21st Cong., 2d sess., 53; Cushing, *New Hampshire Iron Company*, 9–10.
[88] *American State Papers, Finance*, V, 786; Page, *New Hampshire Iron Company*, 8.
[89] *American State Papers, Finance*, IV, 118.
[90] McLane, *Report on Manufactures*, II, 5; I, 580, 667, 1020; II, 99, 863, 867.
[91] Stuart, *Three Years in North America*, I, 389.
[92] *E.g., Sen. Doc.* 72, 62d Cong., 1st sess., Part III, 1757, 1763, 1816, 1983; *cf.*, however, *id.*, 1761, 1824, 1982, 1983.

Iron Company were at the rate of 40 per cent per annum.[93] The Peru Iron Works, according to their own reports, earned about 60 per cent yearly between 1857 and 1860.[94]

Capital invested in the manufacture of lumber, leather, paper, and pottery was reported, in 1846, to return from 10 to 25 per cent. Twenty years earlier a Rhode Island company, engaged in both cotton-spinning and tanning, found spinning the more profitable line of business.

Most contemporary evidence in government reports as to manufacturing profits is colored by the desire of witnesses to get more protection. Earnings were probably higher than stated. Dividend records are of course more reliable, but they do not cover the entire profit-and-loss account of industry. Necessarily capital earned as much in manufactures as in commerce and banking, and in other branches of production; otherwise it would not have been invested. Most manufacturers used banking capital in their business. Analogous considerations lead us to suppose that industrial profits ruled higher in the West and South, where capital was scarce and interest was high, than in the older manufacturing centers of the East;[95] for the same reason they probably averaged higher in America than in many places abroad. What the average rate was in any locality, or during any period, it is of course impossible to state, but the record of average annual dividends on $20,000,000 of New England manufacturing capital for a decade is probably as good a clue in this direction as we possess. That rate was about 10 per cent, and we know that it does not include compensation for the personal services of proprietors or other subsidiary forms of revenue often confused with true capital returns.[96] Such a profit sufficiently explains the increase of manufacturing investments in the United States before the Civil War.

COMMERCIAL CRISES

The American States were recovering from the commercial crisis that followed the Revolution when the Constitution was adopted. Three other great crises, in addition to minor depressions, visited the country prior to the Civil War; they occurred about twenty years apart and were coincident with similar troubles in Europe. The first covered approximately the years from 1815 to 1820, the second from 1837 to 1840, and the third, beginning in 1857, was approaching a termination when the Civil War broke out. They were primarily money panics and were characterized by currency contraction. In 1814 all banks but those in New England suspended specie payment, and a flood of

[93] *Worcester Spy*, Mar. 8, 1854.
[94] Peru Magnetic Steel and Iron Works, *Prospectus*, 1865.
[95] *Cf.* McLane, *Report on Manufactures*, II, 3, 860–861.
[96] *Hunt's Merchants' Magazine*, XXI, 632, Dec. 1849.

paper money inflated prices. Though specie payment was resumed three years later, the depression reached its maximum in 1819. Our circulation in 1813 was $70,000,000, two years later it had risen to $110,000,000, and in 1819 it had fallen to $45,000,000—a contraction of 59 per cent in three years.[97] Between 1815 and 1820 the population of Philadelphia, our largest manufacturing city, declined by 10,000.[98]

Accompanying, and in part explaining, these adverse conditions, was the flood of imported goods that crossed the Atlantic at the close of the war. In 1816 almost every textile mill in New England was closed. Some factories in Massachusetts and Connecticut, the Slater mill at Pawtucket, the Thurber mill at Providence, and the Lippitt mills continued practically without interruption to manufacture yarn for local users. The Lippitt mills owed their continuance to a contract with the Vermont penitentiary, where their yarn was woven by prisoners.[99] In explanation of their suspension of operations, the directors of the Coventry mill stated that it was "owing to the high price of cotton, the low price of goods, and the difficulties attending the currency of the Middle States."[100] The wool manufacture was equally prostrated, its activity being reduced to supplying carded wool and yarn to neighboring households.

The difficulties of mill-owners were accentuated by their persistence during the war in holding goods too long on an advancing market in the hope of still higher prices. When peace suddenly opened our ports to British commerce, these speculative manufacturers, whose credit was already overloaded by their warehoused stock, were irretrievably ruined. Also, during the war the poorly made fabrics of ill-equipped and inexperienced manufacturers had found customers, but as soon as better imported goods competed with them they became unsalable.

Cotton manufactures revived temporarily under the encouragement of a protective tariff and the power-loom, though they experienced new reverses in 1819 and 1820. In October 1819 a citizens' committee in Philadelphia, after a canvass of twenty leading manufactures in that city, reported that these industries had employed 9188 operatives in 1814, 9672 in 1816, and but 2137 in 1819; and that their weekly pay-roll had fallen in three years from $58,000 to less than $13,000.[101] In Market Street, as late as 1822, "houses of four stories, with marble steps and copper spouts, were in great numbers sold for a dollar apiece."[102] These houses were on leased ground. In Pittsburgh the number of employees engaged in manufacturing declined from 1,960 in 1815 to 678 in 1819, and the product of manufactures decreased

[97] *American State Papers, Finance,* III, 496, 597.
[98] Woolsey, *First Century of the Republic,* 168.
[99] *Bagnall Papers,* II, 1366–1367, III, 2003; Burrill *et. al., Petition to the Senate, 1815.*
[100] Bagnall, *Textile Industries,* 410.
[101] Hazard, *Register of Pennsylvania,* IV, 168, Sept. 12, 1829; *Niles' Register,* XVII, 117, 118, Oct. 23, 1819.
[102] Wm. Cobbett, *The Curse of Paper Money and Banking,* Introduction xiv–xv.

from $2,618,000 to $832,000.[103] According to a British traveler, "there were 1,188 persons destitute of employment, and a cry of distress was universal."[104] Such a crisis depreciated industrial investments, scattered labor and forced it into new pursuits, interrupted established business connections, and disorganized markets. In the words of a witness:

"Nearly all the manufacturing establishments of the country were broken up, their owners ruined, and their property sold at enormous sacrifices; it may be said, indeed, that nearly the whole of these establishments changed owners, and were taken up at successive abandonments and reductions of capital, all which, however, proved but successive steps to ruin."[105]

Henry Clay said of New England:

"In passing along the highway one frequently sees large and spacious buildings, with the glass broken out of the windows, the shutters hanging in ruinous disorder, without any appearance of activity, and enveloped in solitary gloom. Upon inquiry what they are, you are almost always informed that they were some cotton or other factory, which their proprietors could no longer keep in motion against the overwhelming pressure of foreign competition."[106]

In cotton manufactures, this crisis stimulated technical improvement, and hastened the introduction of automatic weaving. But capital was lacking, and conditions were not yet ripe, for the immediate adoption of corresponding improvements in other industries. However, a growing population and the elasticity of enterprise natural to a new country gradually revived commercial prosperity, together with manufacturing pursuits.

The panic of 1837 was both financial and commercial in origin, but its financial aspects lie without our topic. British mercantile houses had allowed American importers to pyramid credits in England by accepting their bills, with an understanding that before maturity bills signed by other parties might be substituted for those falling due. As this practice stimulated undue purchases of foreign manufactures, it was evidently unfavorable to American industry, and its termination by the panic was a compensating feature of that event.[107] Many manufacturing companies throughout New England and the Central States failed, not entirely because their business was unprofitable, but because they could not, in default of currency, realize upon their assets to meet immediate obligations. This crisis affected more severely large than small manufacturers. The former were more generally

[103] Hazard, *Register of Pennsylvania*, IV, 169, Sept. 12, 1829; Philadelphia Society for Promoting National Industry, *Addresses*, 241, 242.

[104] Pearson, *Notes on America*, 20.

[105] Joshua Gilpin, in McLane, *Report on Manufactures*, II, 854; *cf.* also *Niles' Register*, XVI, 273, June 19, 1819.

[106] Henry Clay "Speech in U. S. House of Representatives," Apr. 26, 1820, in *Works*, VI, 233; *cf.* also *North American Review*, VII, 188, July 1823.

[107] Winthrop, *Memoir of Nathan Appleton*, 44–45; *cf.* Evans, *History of the Commercial Crisis, 1857–58*, 20.

involved in land, banking, and commercial speculations, and not a few failed for reasons outside their industrial operations; but some strong companies, like the American Print Works, took advantage of the prevailing low wages to accumulate goods which they sold at a great profit when normal prices were restored.[108]

Contemporary changes in general business conditions made this depression a dividing line between two industrial periods. In the making of boots and shoes the transition from the merchant employer to the factory-owner as the dominant organizer of production was facilitated by the failure of many of the older firms that had hitherto controlled commercial manufactures in New England.[109] Financial embarrassments impressed on Chauncey Jerome the need of wider markets for clocks, and led to the introduction of brass works and the beginning of the foreign trade in that article. This in turn reacted on an entire group of metal-working industries in the United States.[110] The manufacture of Manila paper in this country is said to date from the use of old rope as paper stock in 1837, when money could not be obtained to buy other materials.[111] In the wool manufacture the upsetting of established routine and the introduction of new management in many enterprises hastened changes of fabrics, already under way in response to market demand and improved industrial technique. By chance, the first commercial production of anthracite iron occurred during the panic year.

As an influence affecting manufactures, the crisis of 1857 is almost lost in the larger vortex of the Civil War. Moreover, by the time it occurred the industries of the country had acquired resources to resist such a disaster that they did not possess at an earlier period. In 1837 merchants owed the Government immense sums for duty; in 1857, under cash payments, they had no such obligations: in 1837 exchange on England was scarce and high and bullion was exported to pay foreign debts; in 1857 exchange was low and California was constantly replenishing the nation's coffers with precious metals: in 1837 the Treasury was empty; in 1857 it had $20,000,000 in specie in its vaults: in 1837 agriculture was neglected and wheat was imported from Russia; in 1857 farm products were abundant.[112]

The industrial depression that accompanied this crisis was partly a reaction from a period of unusual prosperity at home and abroad, which had encouraged an undue increase of manufacturing facilities in both Great Britain and America. But under the ad valorem tariff of 1846 foreign imports rapidly rose and European competition became

[108] *American Wool and Cotton Reporter*, XV, 1640.
[109] Blanche Hazard in *Quarterly Journal of Economics*, XVII, 251–252, Feb. 1913.
[110] Jerome, *History of the American Clock Business*, 54, 55, *et seq.*
[111] Hollingsworth and Whitney Co., *Catalogue*, 1893.
[112] Letter of Amasa Walker, Oct. 20, 1857, in *Hunt's Merchants' Magazine*, XXXVII, 531–534, Nov., 1857.

more pressing. Much capital was absorbed by railway development. This expenditure was met largely by State, county, and city railroad bonds. These paid high interest, and their competition in the money market made loans dear for manufacturers. Railway extensions also invited land speculation, but this evil was not so great as before the previous crisis.

Cotton manufactures had recently made such headway in the South that they already foreshadowed the attainments so long deferred by war and reconstruction. These suffered severely from the money stringency of 1857. In the North some great textile enterprises failed. Among these were the Bay State mills at Lawrence and the Middlesex mills at Lowell, but their misfortunes were due primarily to mismanagement. Financial difficulties also proved fatal to a great enterprise at Holyoke, and caused much loss of capital to other establishments which had just commenced operations. No further rapid development of cotton manufacturing occurred until after the Civil war. Woolen mills, under the provisions of the Walker tariff, had been less prosperous than formerly, and suffered more severely than in 1837; but the same year a revision of duties, affording cheaper raw materials, gave encouragement to this industry that partly counteracted the influence of the panic.

Local and minor depressions occupied almost as prominent a place as the three great national business crises in the annals of particular industries. Generally the heaviest losses incurred by textile manufacturers were related in some way to the fluctuating price of wool and cotton. In the days of homespun and domestic weaving the cost of raw materials had little effect on the prosperity of industry. Such materials were usually produced by the manufacturer himself, or procured through barter. A raw-material market hardly existed, and its lack hampered the progress of our first manufactures. So rudimentary was the machinery for supplying our early factories with the stock they manufactured that their operations frequently were curtailed or suspended by lack of materials with which to work, or their capital was absorbed in purchasing supplies long in advance of actual use. The speculative risk of holding such commodities thus fell upon the manufacturer. Many a promising cotton or woolen mill became insolvent through losses on the materials which it had purchased or contracted for, and not through failure to manufacture economically.[113]

The extreme fluctuation of prices during the early part of the last century accentuated these evils.[114] Cotton purchased one season sometimes cost more than the value of the yarn manufactured from it the following spring.[115] The price of iron bars varied 50 per cent within a

[113] *E.g.*, McLane, *Report on Manufactures*, I, 950, question 6. After the passage of the Walker tariff, Saxon wools fell immediately from 75 to 25 cents a pound; Villard, *John Brown, 1800–1859*, 58–65.

[114] *Cf.* McLane, *Report on Manufactures*, I, 938.

[115] This happened in 1825–1826; *cf. New York Shipping List* and *Turner's Commercial List.*

decade. It seems to have been more difficult to contract ahead for the disposal of a factory's product at a definite price than to contract equally in advance for the stock required to make these goods. The solicitude of mill-owners to assure themselves the means of continuing in regular operation was greater than the solicitude of merchants to buy their output, for the latter always had the recourse of importing in default of domestic merchandise.

Even after a raw-material market had been created, and the mill-owner no longer was forced to be a warehouser and speculator in the commodities he manufactured, the price movement of these materials continued to exercise an important influence on industrial prosperity. The general effect of falling prices was unfavorable to manufacturers. Prospective buyers, hearing daily of lower quotations for raw materials, fancied that the wares they sought would fall in equal ratio. They overlooked the fact that the cost of making these remained the same, and that prices for finished goods may be depressed to a point where no one receives a profit from them. Mill-owners attempted to reimburse themselves for their smaller gain from manufacturing by greater output. Warehouses were overstocked, and overproduction appeared with its ruinous influence upon legitimate business.[116] On the other hand, rising prices for materials, although these might not be reflected immediately in higher quotations for finished fabrics, created an active demand for goods, caused by the purchasers' fear of still higher quotations in the future.[117]

However, crises affecting but a single industry usually passed so rapidly that it is difficult to trace in their effects results illuminating the general history of manufacture. The cotton industry, after a period of prosperity in the middle twenties, suffered a relapse in 1829 and again in 1834 and 1840, but in such instances speedily recovered. An era of prosperity in the middle forties was followed by declining demands and overproduction a few years later.[118] The stock on hand of the Boston Manufacturing Company, between 1836 and 1839, averaged less than 500,000 yards; between 1840 and 1843 it rose to nearly four times that amount. Thereafter the market cleared, and for some years less than 100,000 yards remained in the warehouse. In 1850 another period of overstock occurred, and the quantity on hand approached 2,000,000 yards. Again brisk demand reduced this amount, until the panic year of 1857, when the warehouses were again filled with unsold goods and remained so until 1859.[119]

Iron manufactures suffered even more than textile from periods of commercial depression. They required the employment of a large

[116] *Cf.* Aachen, *Bericht der Handelskammer, 1885*, quoted in Hoff, *Die Industrieentwicklung im Bezirk Aachen*, 62.

[117] However, this was not true in 1815–1818, when raw cotton advanced rapidly in price, but the American market was flooded with British cloth.

[118] See 552–553, *f.*

[119] Boston Manufacturing Co., *Manuscript Accounts.*

capital, both in the interest of technical economy and of commercial stability. The cost of labor and raw materials bore a high ratio to the value of product. Large financial resources were required to carry stocks over a season of unprofitable markets. Employees of textile mills were largely women and children, who in case of a temporary suspension of operations were less likely to be attracted to other occupations and other localities than men employed at furnaces and forges. The dependence of the iron industry upon special skill and an organized personnel, and therefore upon continuous operation, was greater than that of most other manufactures. Ironmakers suffered especially from the collapse of the railway boom. Some added to other business burdens by accepting bonds in payment for rails and rolling stock, and the depreciation of these brought ruin to their enterprises.[120]

Any period of excessive importation—that is, exceeding normal growth as indicated by the increase of preceding years—caused a corresponding curtailment of the domestic market, which was practically the only market at this time supporting American industries. The ability of the people to pay for domestic manufactures was reduced approximately by the amount they paid for foreign goods. In addition, periods of large importation were usually followed by a scarcity of money, because our foreign purchases expanded faster than the value of our exports. This necessitated sending currency to Europe in making settlements, or else added to our commercial indebtedness abroad, and increased the rate of interest.[121] At the best, American manufacturers were operating with limited capital. They depended on banking and mercantile credit. Increased competition and higher interest, therefore, accompanied each other, and attacked their prosperity from both sides, by lessening the return from their goods and adding to the cost of producing them.

Excessive foreign purchases did not necessarily correspond with tariff changes. The tariff was one of several influences affecting imports, but was subordinate to commercial and industrial conditions in other countries. Overproduction and low prices in England, combined with tight credit, forced manufacturers there to realize upon stocks in hand and induced shipment to America in spite of the high duties. For this reason crises in particular industries, such as the wool manufacture in 1826 and iron making in 1843 and 1853, accompanied or followed British crises in the same business.

Foreign purchases were governed also by American financial conditions. An inflation of currency and bank credit made prices rise. This encouraged tradesmen to lay in larger stocks in order to profit by the ascending market. Added demand caused more goods to be imported and to be made at home. Consequently, production soon out-

[120] *Cf.* Brady's Bend Iron Co., *Report*, 1864, 5.
[121] *Cf.* Great Britain, *Parliamentary Papers*, 1833, VI, 126, questions 2057, 2062.

ran actual needs. In fact, with a continuous and rapid rise of prices, purchases for consumption declined. A reaction naturally followed, which fell heavily on manufacturers. They already had engaged high-priced raw materials needed to continue their former rate of production. When they were unable to dispose of their output, not only were their operations curtailed, but their assets were reduced by the falling value of stock in hand, and by loss of interest on the investment this represented. Prices were depressed even below cost of production, because foreign wares were sacrificed for less than the expense of making them.

COST OF PRODUCTION AND PRICES

Improved processes and machinery caused prices of raw materials and finished products to approach each other. Natural resources were made accessible so rapidly that crude commodities continued abundant and cheap despite new facilities for their utilization. Economies of production were not confined to manufacturing, but were common to other fields of activity. Land freights fell 90 per cent in a few years, and farm machinery added greatly to the return from agricultural labor. All phases of this development were coördinate and interdependent. Manufacturing progress required the copious materials and broader markets that improved agriculture and communication afforded, for one element of its new economy was large-scale production.

When industrial advance lagged this was shown in stationary price relations. In 1732 a pig-iron netted a profit in Virginia when it sold for $18 at the works, and shortly before the Revolution it was estimated to cost $12.63 at a New Jersey furnace.[122] Before 1810 the reported expense of manufacture was about $19 in New Hampshire, and possibly higher in some other parts of the country.[123] In 1828 makers of bar iron valued pigs at $26 and $20 in cost accounts,[124] and shortly afterwards they sold as low as $23 in Pennsylvania.[125] Probably during the charcoal era the furnace cost of pig-iron ranged around $20 a ton. It was reduced to the neighborhood of $15 a ton within the first decade of the use of coal for smelting. Coke and anthracite iron in Virginia, Pennsylvania, and Ohio cost from $14 to $16 a ton, and the Cambria works hoped to produce it for far less than that sum.[126] Charcoal iron held pretty near its former prices, and it is doubtful if furnace economies greatly lessened the cost of its manufacture in view of the increasing value of timber and the consequently greater cost of fuel.[127]

Omitting from consideration changes in the purchasing power of

[122] Hasenclever, *The Case of Peter Hasenclever*, 81; *cf.* 138 preceding.

[123] *Letter to the Directors of the New Hampshire Iron Factory*, London, Sept. 9, 1810; French, *History of the Iron Trade*, 17.

[124] *American State Papers, Finance*, v, 788.

[125] McLane, *Report on Manufactures*, II, 277, 351; *cf.*, however, *id.*, 183, question 27.

[126] French, *History of the Iron Trade*, 63, 152; Crescent Iron Manufacturing Co., *Report for 1855; National Magazine*, I, 48–50, July 1845; John Fritz, *Autobiography*, 95.

[127] *Western Journal and Civilian*, XIII, 332–334, Apr. 1855; *cf.* Hayes, *Memorial of the Iron Manufactures of New England*, 7–8.

money, iron was probably a more expensive article to make in 1832 than in 1732. During these one hundred years furnace practice had not advanced enough to counteract opposing cost factors, such as higher wage and scarcer fuel; and although the next two decades witnessed technical improvements that somewhat lowered production charges, this tendency was less marked than in most other branches of manufacture.

So long as bar-iron was refined at forges its cost likewise remained about stationary. In 1731 a Philadelphia merchant bought pigs for $21.33 a ton and paid a contractor $36.53 to manufacture them into bars.[128] One hundred years later, at Carthage, New York, pig-iron valued at $31 a ton was made into bars at a cost of $39.[129] In 1857 similar iron was made at Clintonville, New York, for $50 a ton, of which one-half probably represented smelting costs, while in western Pennsylvania the Brady's Bend Company manufactured puddled rolled bars from coke iron, costing $15.06, at an expense of only $9.50 a ton.[130] Between the two latter dates the cost of making pig-iron had decreased from one-fourth to one-half, and the cost of making bars from one-third to three-fourths, according to the process employed. Rolled coke iron did not command so high a price as hammered charcoal iron, but before 1860 the two were approaching each other in quality.

American pigs sold in Great Britain between 1730 and 1740 for $27 per ton. In the United States, a century later, they were seldom below $30 and sometimes as high as $50.[131] In 1731 the bars manufactured by a Philadelphia merchant were worth about $106 a ton; one hundred years later the price in America had fallen to $90, although the cost of production had not decreased.[132] This was due to the competition of a better process abroad, and in 1859, when that process was well established in America, the domestic price was $60.[133]

In case of textiles, economies due to machinery were realized earlier and were greater in extent than in the manufacture of iron. The difference between the price of a pound of cotton and a pound of yarn was 27 cents in 1815, 28 cents in 1820, 15 cents in 1830, and 10 cents in 1841.[134] During the forty years ending with 1845 the price of cotton yarn fell from 92 cents to 19 cents. An even greater decrease occurred in the price of fabrics. Between 1808 and 1814 three-fourths brown shirtings were 42 cents a yard; in 1820 they were 13 cents; in 1830, 7.5 cents; in

[128] Philadelphia Merchant, *Manuscript Journal*, July 1731, 421; Nov. 17, 1731, 448; Jan. 4, 1732, 461; Jan. 1733, 515.

[129] McLane, *Report on Manufactures*, II, 183, question 27; *cf. American State Papers, Finance*, V, 788.

[130] Peru Magnetic Steel and Iron Works, *Prospectus*, 1865; Brady's Bend Iron Co., *Report*, 1858–1864; *cf.* also Crescent Iron Manufacturing Co., *Report*, 1855; *Documents Relating to the Manufacture of Iron*, 46.

[131] *E.g.*, *Sen. Doc.* 21, 62d Cong., 1st sess., 501.

[132] It had been lower. *Cf. Sen. Doc.* 67, 21st Cong., 2d sess., 20, 53; *Hunt's Merchants' Magazine*, VI, 518, June 1842; McLane, *Report on Manufactures*, II, 290.

[133] *Commercial Bulletin*, Dec. 24, 1859; appendices V and IX, Table 2 and chart.

[134] *National Magazine and Industrial Record*, III, June, 1846.

1840, 6 cents; and in 1849, 4 cents. In case of plain and colored goods the same tendency for prices to approach each other was manifested.[135]

Even where economies of production did not depend so largely on new processes as in case of iron, or on automatic machinery, as in case of textiles, better organization and division of labor accomplished the same result. In 1810 Connecticut wooden clocks cost from $20 to $50, and clocks with metal works even more. The use of interchangeable parts, simpler processes of manufacture, and metal-cutting machinery lowered the price of brass clocks to $20 in 1825 and to $6 before 1840. At the latter date ten clocks could be bought for what would have been the price of one twenty-five years earlier. But the reduction did not stop here, for in 1855 clocks were manufactured to sell for 75 cents.[136]

Decreased labor-cost of production, which is the most important of several variables that measure the value of mechanical improvements, helps to explain this fall in prices. From the close of the seventeenth century until the introduction of automatic machinery for spinning and weaving the cost of textile operations in America remained constant. About the year 1700 yarns of cotton, flax, or wool were spun for 8 cents a run, the equivalent of 4 cents a skein in later measurements; and the cost of spinning the coarse cotton or woolen yarns then used was about 20 cents a pound. In 1756 cotton candle-wick likewise was spun in Rhode Island for the latter price. During the Revolution the rates paid textile labor in New England remained the same as in the earlier period. Linen warps, cotton filling, and tow yarn were spun for 8 cents a run. In Virginia the price for spinning wool varied from 11 to 25 cents a pound, and for cotton from 33 to 67 cents. After the Revolution the spinners working at the Hartford woolen manufactory received 8 cents a run or about 20 cents a pound for spinning wool.[137] In the South most of the spinning was done in families or by slave girls, and very few entries for this labor occur in southern account books, though weaving items are common. In 1782 the cost of spinning in Virginia varied from 17 cents a pound for coarse tow yarns used in making osnaburgs to 33 cents a pound for cotton warp used in mixed cotton and woolen goods.[138] As late as 1816 in Rhode Island women were employed to spin wool at their homes for 4 cents a skein.[139]

These data, fragmentary as they are, indicate clearly that the price of household textile labor had remained about stationary for over a century, and that the labor-cost of spinning normally ranged from 20 to 30 cents per pound of yarn, according to the fineness of the product and the material employed. The sudden reduction in piece-work rates

[135] Appendix IX, Table 2 and charts.

[136] Jerome, *History of American Clock Business*, 35, 87. New Haven works made padlocks at a cost of 5 cents each; Committee on the Machinery of the United States, *Report*, 12, in Great Britain, *Parliamentary Papers*, 1854–1855, L.

[137] *Cf.* 156–157, preceding.

[138] *Documentary History of American Industrial Society*, II, 315–316.

[139] North, *New England Wool Manufacture*, in *The New England States*, 204; National Association of Wool Manufacturers, *Bulletin*, XVI, 161–162, June, 1886.

following the general use of automatic machinery is indicated by the fact that in 1816 Nathaniel Stevens, at North Andover, was paying 0.5 cent a skein, or one-eighth the former price, for spinning-mule yarn; while at Waltham, with superior mechanical equipment, the price at the same date had been reduced to 0.2 cent a skein.[140] Although the Waltham piece-work prices were lower than those of competing mills in New England, the earnings of their operatives were higher, as indicated by the higher time-rates they paid their hands. Household workers, spinning yarn for 4 cents a skein, earned upon an average from 12 to 20 cents a day, while in 1817 a Waltham mule-spinner actually earned $2.50 a day.[141]

The labor-cost of weaving followed a similar course. At the opening of the eighteenth century the usual price for making coarse fabrics of cotton and linen, kerseys, and worsteds, in Massachusetts, varied from 6 to 8 cents a yard. From that time until the Revolution cottons, woolens, and towcloth, plain and striped, were woven for 4.5 and 5 cents a yard. The Virginia price for weaving country cloth of cotton and linen was somewhat higher, or from 5.5 to 6.5 cents a yard. Jeans were woven for 21 cents, ticking for 25 cents, fine linen for 28 cents, and coarse osnaburgs for about 10 cents.[142] In New Jersey during the Revolution the price of weaving linen cloth was about 7 and 8 cents a yard, "coating" 13 cents, and double-width linen 16 cents. Stripes from dyed weft, necessitating the use of three or four shuttles, were woven for 16 cents a yard, and sheeting for about the same price.

The New Jersey rate for weaving woolen cloth and worsted in 1787 and 1788 was 13.33 cents a yard, or 1 Pennsylvania shilling.[143] The Hartford Woolen Manufactory a year later paid 12 to 14 cents a yard for weaving coarse cassimeres and coatings.[144] At the close of the Revolution the price of weaving coarse cotton, and cotton and woolen cloths, in Virginia, was 5.67 cents, while fine woolen cloths were woven for three times that amount, or a shilling a yard.[145] Shirting that sold for 55 cents a yard was woven for 8.33 cents.[146] In 1811 Baltimore manufacturers paid 12 cents a yard for weaving coarse cotton cloth, 3 yards to the pound.[147] These rates did not vary materially during the War of 1812, at a time when domestic cottons from the Rhode Island factories sold for 42 cents a yard. The latter fell from 42 cents to 32 cents between June and September 1815, without a corresponding reduction in the

[140] Nathaniel Stevens, *Manuscript Account Books;* Boston Manufacturing Co., *Manuscript Account Books;* Slater and Tiffany, *"Accounts Settled, 1817–1819," passim* (in *Slater Papers*).
[141] Boston Manufacturing Co., *Manuscript Account Books*, May payroll, 1817.
[142] *Cf.* Appendix, VII.
[143] Potter, *Manuscript Account Books*, 1787–1788.
[144] Hartford Manufactory Co., *Manuscript Accounts;* Wansey, *Excursion to the United States*, 261.
[145] *Documentary History of American Industrial Society*, II, 315–316.
[146] Martin Cockburn, *Manuscript Account Books.*
[147] Bagnall, *Textile Industries*, 494. For much lower rates in New England, see *American Wool and Cotton Reporter*, XIV, 1286.

cost of labor.[148] The next year Nathaniel Stevens, at Andover, paid 12 cents a yard for weaving satinets.[149] This was only half the price for weaving the same fabric at Peacedale four years later, when weavers were paid from 20 to 25 cents, according to the grade of goods.[150]

Apparently with the increase of water-spun yarn, outstripping the ability of hand-loom weavers to manufacture it into cloth, the wages of the latter held very firm. In Virginia, in 1817, 10 cents was paid for weaving homespun cotton cloths, though domestic cotton fabrics had fallen to 23 cents a yard, or a little over half their price two years before.[151] However, at the time the Virginia planters were paying 10 cents, Nathaniel Stevens secured weavers for shirtings for 6 and 9 cents a yard. He paid 12 cents for weaving ticking and 25 cents for broadcloth.[152] The great decline in piece-work rates that came with the use of the power loom is indicated by the fact that the Waltham mills at this date were paying 1.25 cents a yard for weaving cotton sheeting.[153] By 1820 the price of weaving in Virginia had fallen, apparently to meet the competition of northern factories. A small yarn mill in Bedford County employed household looms to manufacture cotton cloth for 5 cents a yard.[154] The price of weaving jeans, which had been 25 cents a yard in Virginia at the time the Constitution was adopted, was 1.5 cents a yard in Rhode Island fifty years later. Full-width kerseys were woven by power for 1.2 cents, and plain cloths according to width for 6 and 7 mills a yard.[155]

WAGES IN AMERICA AND ENGLAND

In 1791, after four years of operation, during which they had experimented with immigrant labor and finally turned almost exclusively to native help, the proprietors of the Beverly cotton mill wrote:

> "On a comparison of the prices of labor in this country with those of Great Britain, we perceive that although the wage of common labor is much higher here, yet that of the artificer is not. Here the demand for labor is chiefly agricultural and the wages seem to be regulated by it. There the mechanic arts afford so much employment that the demand for every species of skill and ingenuity is constant and high. Hence it happens that we can satisfy our artists with wages very little above the common labor of the country, while those who come from Europe will not work without a much greater price.[156]

About the same time Tench Coxe, who was well informed as to manufacturing conditions in both countries, expressed a similar opinion. A

[148] Martin Cockburn, *Manuscript Accounts*, June, Sept. 1815.
[149] Nathaniel Stevens, *Manuscript Accounts*.
[150] R. Hazard, *Manuscript Account Book*, 1820. In the same book are entries for weaving sheetings at 5 cents a yard.
[151] Martin Cockburn, *Manuscript Account Book*, May, July, 1817.
[152] Nathaniel Stevens, *Manuscript Account Books*, 1817.
[153] Boston Manufacturing Co., *Manuscript Account Books*, May payroll, 1817.
[154] *American State Papers, Finance*, IV, 142.
[155] R. Hazard, *Manuscript Account Book*, 1846.
[156] Letter of George Cabot, Sept. 6, 1791, in *Hamilton Papers*, Library of Congress.

memorial to Congress by citizens of Baltimore in 1817 stated that hats, shoes, and many other articles were manufactured in America, where labor-saving machinery was not employed, in successful competition with Great Britain.[157] Three years later wages in woolen mills were said to be as low in Massachusetts as in England.[158] In 1831 Nathan Appleton stated that the pay of operatives on coarse cottons was not higher in America than abroad, and that very low wages cited in England were those of hand-loom weavers thrown out of employment by power machines. He added:

"I have no hesitation in asserting that in this particular article . . . we pay a less sum for labor in converting a pound of cotton into a pound of cloth, than is paid in Manchester for the same purpose."[159]

This generalization was confirmed by English testimony two years later.[160] In 1840 a British manufacturer, practically familiar with American cotton mills, estimated that mule-spinning was probably cheaper in New England than in Glasgow, adding:

"Throstle spinning is nearly as cheap in this country as in Britain, in consequence of the higher speed at which spinning frames are driven, and the greater quantity of work produced in a given time; [but that] in every department the rate of wages is generally higher in the United States than in Great Britain."[161]

The apparent contradiction of these statements to popular opinion at the time, and to much of our evidence upon this subject, disappears upon analysis. Three classes of workers must be considered in comparing wages in the United States and Great Britain. Unskilled labor was usually in demand in America, and access to cheap land caused its remuneration to be measured by the rewards and advantages of independent agriculture. Therefore it was always difficult to procure hands for the arduous operations of mines and furnaces. For such services wages were a third or a half higher in America, and the pay of unskilled laborers approached closer to that of skilled mechanics than in Great Britain.

A second class comprised expert operatives and artisans. Americans of the eighteenth century understood how to till fields, sail ships, fell forests, and run sawmills; but they knew little of complex machinery or factory operations. Farmers had no inducement to apprentice their sons to trades, because they could employ them better at home, with

[157] Philadelphia Society for the Promotion of National Industry, *Addresses*, 265.

[158] North, *New England Wool Manufacture*, in National Association of Wool Manufacturers, *Bulletin*, xxx, 136, June 1900; *cf.*, however, *American State Papers, Finance*, v, 829, 831.

[159] *Banner of the Constitution*, II, 143–144, Apr. 1831.

[160] *Parliamentary Papers*, 1833, VI, 70, questions 1153–1155; 71, questions 1161–1172; 167–168, questions 2618–2627, 2638–2640; 169, questions 2657–2663; 322, questions 5384–5391. *Cf.*, however, Allen, *Science of Mechanics*, 347; Montgomery, *Cotton Manufacture*, 136; Baines, *Cotton Manufacture in Great Britain*, 509; and White, *Slater*, 165.

[161] Montgomery, *Cotton Manufacture*, 136–137; *cf. Sen. Doc.* 72, 62d Cong., 1st sess., Part III, 1807, question 14; 1809, remarks on question 14.

the prospect of an independent life in agriculture. Native manufacturing skill, therefore, was scarce, and the first concern of all new undertakings was to procure experienced operatives. These usually came, in spite of hostile foreign legislation, from abroad, and received high compensation.

A third class was factory labor. This was recruited mostly from the women and children of farms and villages, often for temporary service. No other occupation for these workers then existed except household pursuits, and many such occupations were disappearing before factory competition. The rise of the factory system, therefore, transferred labor from the home to the mill, rather than created a new labor demand. In fact, the amount of human time and energy devoted to manufacturing in New England and the Eastern States was probably less in proportion to the population in 1850 than a half century before. In respect to this class of workers, the only economic motive for higher wages in America than in Great Britain was a higher standard of living, supported by better remuneration in other pursuits. Where the labor cost of production was greater in the United States, this was partly because American operatives were amateurs, while those of Great Britain were professionals. The former worked in factories for a few years anticipatory to other life vocations; the latter followed an employment adopted in childhood which they expected to continue as long as they worked at all.

Omitting temporary depressions, nominal wages trended constantly upward. In 1755 the daily pay, in addition to board, of 200 laborers employed on the new road through the Cumberland country to the Ohio was 33 cents.[162] In 1812 the corresponding wage of 30 laborers on the State road from Buffalo to Genesee was 46 cents.[163] According to an investigation made early in the last century, the average wage of unskilled workers, without board, in the principal cities of the United States for the first six months of each year mentioned was: 50 cents in 1785, 50 cents in 1790, 95 cents in 1795, 90 cents in 1800, and 75 cents in 1805.[164] As late as 1846 Irish and German laborers, living in shanties built by themselves on contractor's land in Brooklyn, worked during the winter for 65 cents a day,[165] which was also the rate paid common hands at iron works in Baltimore.[166] However, after the beginning of the canal and railway building era, about 1820, the normal day's wage of common labor, without board, seldom fell below 75 cents, and ranged from that point to $1.25, according to locality and

[162] Broadside, in *Shippen Papers*, I, in Pennsylvania Historical Society Library.

[163] *Buffalo Gazette*, Jan. 14, 1812.

[164] Blodget, *Economica*, 142; *cf.* Wright, *History of Wages and Prices in Massachusetts*, 278, 279; McMaster, *History of the United States*, II, 179, 617.

[165] *New York Weekly Tribune*, May 2, 1846, quoted in *Documentary History of American Industrial Society*, VIII, 225–226.

[166] Finch, *Notes on Travel in United States*, quoted in *Documentary History of American Industrial Society*, VII, 48.

season. A comparison of wages in England and the United States, made about 1825, which has been accepted as authoritative, estimated the average pay of an unskilled laboring man in the former country at 74 cents a day as compared with $1 in the United States.[167] Difference in wages between the two countries was greater in unskilled than in skilled occupations.

Our early manufacturers testified repeatedly that the compensation of industrial labor followed very closely rates paid in agriculture, and sometimes asserted that the main inducement for working at a factory or furnace in preference to a farm was greater continuity of employment rather than higher earnings. Massachusetts farmers paid their laborers in 1795 from $9 to $12 a month and board. In the western part of the State hands sometimes received $15, while around Plymouth their pay fell to $7 or $8. At Geneva, New York, and in Virginia white help received $10 a month. But this was a period of exceptionally high wages, and some of the rates just quoted were not exceeded before 1860.[168] A study of wages and prices in Massachusetts, made in 1883, indicated that the average daily pay of agricultural labor in that State, without board, rose from 50 cents at the opening of the century to $1 in 1860, and this accords with the known increase of wages in other occupations.[169] In 1832 New England farmers complained that factories attracted labor and raised wages so that agriculture became unprofitable.[170] To this advocates of manufacturing replied that before the advent of factories the earnings of a farm family did not exceed $200 a year, but that later, with the added wages of children employed in mills, family incomes had increased to $500 to $600, and that, as a consequence, farmers were living better than before and saving money.[171] In this instance child labor did not depress the income of adults below its former level, because of the excess demand for mature workers in non-competing occupations. The claim that factories raised the pay of agricultural labor is supported by the census of 1850, which reported farm wages as higher in Massachusetts and Rhode Island than in any other State except California.

We may note here that some relation exists between the deserted farms and the deserted mill-sites of New England. So long as every neighborhood had its small water-driven factory, rural workers might obtain industrial employment without leaving home. Factories had not materially changed the labor economy of farmers from that of the homespun period. The work performed on the loom and spinning-wheel and at the household forge was merely transferred to a central

[167] Allen, *Science of Mechanics*, 347.

[168] La Rochefaucault, *Travels*, I, 487, 513; II, 100, 205–208, 212, *cf.* O'Callaghan, *Documentary History of New York*, II, 689.

[169] Wright, *History of Wages and Prices in Massachusetts*, 278.

[170] Isaac Hill, [New Hampshire], *Speech in U. S. Senate on Mr. Clay's Resolutions in Relation to the Tariff*, 5.

[171] McLane, *Report on Manufactures*, I, 742, 1046.

establishment within the community itself, and the products of industry were paid for immediately by the labor of the consumer as truly as they had been under a more primitive régime. But when manufactures were gathered into large establishments, remote from the farm household, the latter was no longer self-sufficing. Labor devoted to tilling the soil alone did not enable the farm family to maintain its former standard of living. Children sought employment at distant places and were brought into competition with urban and immigrant operatives, by whom they ultimately were displaced. In the end, therefore, population was withdrawn permanently from the less productive agricultural land and it was thrown out of use.

Building mechanics and artisans in trades long established in America were not organized, and their pay varied widely from season to season and from locality to locality. In Massachusetts the daily wage of carpenters from 1800 to 1830 was about $1.10, or 10 cents more than in Manchester, England.[172] From 1830 to 1850 Massachusetts rates rose to $1.40, and during the following ten years to $2. According to the census of 1850 carpenters' wages in different parts of the country varied from $1.25 to $1.50. Until the gold discoveries in California the latter was the maximum pay of most mechanics, except during unusually busy seasons in large cities. These rates were about one-third higher than those of unskilled laborers in America and of skilled artisans in England; and they accounted in part for the relatively greater cost of mills and factories in this country.

Industrial wages require a distinction between compensation for superintendence and instruction and for ordinary operation. In 1831 the average pay of men in the large manufacturing establishments of New Hampshire was $1.15 a day, while in workshops it was but 83 cents.[173] This was because men in factories included many foremen, directing the labor of women and children. Also workers who possessed a monopoly of skill acquired abroad were paid above the average. Mineral and metal-working industries employed men of this class, as well as many unskilled male workers, thus incurring high costs for labor as compared with those of other countries at both ends of the wage scale. In 1839 puddlers who had been receiving $2 a ton in England enforced a rate of $4 a ton in Maryland.[174] Piece-work prices in the iron industry were influenced further by the fact that American plants could not yet rival the capacity and speed of output of their larger foreign competitors. In 1783 Pennsylvania miners were paid between $5 and $6 a month and provisions. Wages were higher during the harvest than at other times. Foundrymen received 67 cents a ton for running pigs and $5.33 a ton for castings. A foreman founder might earn $25 a

[172] Wright, *History of Wages and Prices in Massachusetts*, 298, 299; *Tables of the Revenue, Population, Commerce, etc., of the United Kingdom, 1832*, Part II. 101, 165, in *Parliamentary Papers*, 1833, XLI.

[173] McLane, *Report on Manufactures*, I, 585.

[174] *Sen. Doc.* 21, 62d Cong., 1st sess., 503.

month.[175] Forty years later, in Pennsylvania, a good founder, with the help of one or two boys, could make $1000 a year.[176] In 1847 some operatives in Pittsburgh were said to clear $40 a week after paying their assistants, and it was quite usual to earn $30.[177] Country bloomeries paid from $16 to $18 a ton for reducing ore to bars. A bloomer with one helper could manufacture nearly 1.25 tons a week, so that the earnings of two men were about $20.[178] Refiners in England earned from $8.50 to $12 a week. Day wages at Birmingham iron works ranged from 55 cents for laborers to $1.33 for mechanics; but the best-paid occupations in this industry were on a piece-work basis. Rollers in Staffordshire could earn up to $5 a day during prosperous years.[179] A contract and piece-work system was introduced at an early date in American machine-shops,[180] and its advantages were highly commended as were the sobriety and intelligence of American mechanics, by a British commission in 1854.[181]

In 1794 the aggregate week's wages of a foreman, 8 assistants, and a boy, employed at the Boston Glass Works, were $58.50. Probably the glassmakers, who were imported workmen, received about $1 a day.[182] In 1831 the glass works at East Cambridge paid men upon an average $1.30.[183] Between 1790 and 1800, at a Berkshire County paper mill, vatmen received $3.50 a week without board.[184] In 1831 the average pay for men employed at paper mills in the same county was $5.40 a week.[185] Shortly before the Revolution a New York refiner paid a sugar-boiler from England $250 a year and board. In 1812, at a Philadelphia refinery, the head boiler was paid $74 a month. The pay of helpers, in both instances, was about one-third that of boilers.[186] In 1833, hat-makers at Baltimore and Schenectady, working by the piece, earned $10 a week.[187] The wages of shoemakers in Massachusetts varied from 67 to 85 cents a day, from the opening of the century until after 1832.[188] In 1844 an English traveler stated that shoemakers in the vicinity of Salem earned about $4 a week, and that shoes were sold

[175] *Pennsylvania Magazine of History*, v, 78.
[176] McLane, *Report on Manufactures*, II, 199.
[177] *Farmer and Mechanic*, I, 346, July 15, 1847.
[178] McLane, *Report on Manufactures*, II, 96, 98.
[179] Porter, *Progress of the Nation*, 447, 449; *Miscellaneous Statistics of the United Kingdom*, IV, in *Parliamentary Papers*, 1862, LX, 257; *cf. Reports of the Secretary of the Treasury*, VII, 652.
[180] White, *Slater*, 254; Bagnall, *Papers*, III, 2374.
[181] Committee on the Machinery of the United States of America, *Report*, 85, in *Parliamentary Papers*, 1854–1855, L. At the latter date, piece-work rates had been established for more than 400 operations at Springfield Armory; *id.*, 47–55.
[182] Boston Glass House, *Manuscript Receipt Book*, 1794.
[183] McLane, *Report on Manufactures*, I, 325.
[184] Crane, *Early Paper Mills in Massachusetts*, in Worcester Society of Antiquity, *Proceedings*, 1886, 15.
[185] McLane, *Report on Manufactures*, I, 145.
[186] J. Van Cortlandt, *Manuscript Sugar House Letter Book*, Nov. 21, 1763; May 15, 1772; Joseph Herzog, *Manuscript Letter Book*, Jan. 4, 1812.
[187] *Baltimore Republican and Advertiser*, July 29, 1833, quoted in *Documentary History of American Industrial Society*, VI, 104, 105, 106.
[188] McLane, *Report on Manufactures*, 223–239. Wright makes the average wage higher; *History of Wages and Prices in Massachusetts*, 280.

as cheap as in England.[189] Between 1806 and 1815 Philadelphia and Pittsburgh bootmakers received about $9 a week, but by 1835 their earnings had fallen to two-thirds this amount.[190] English and Irish wages were about one-fourth less than those in America.[191]

Men working for the Hartford Woolen Manufactory, about 1791, were paid $3 and women $1 a week.[192] This was less than the wage of skilled operatives at Manchester, England, where men earned about $4.25 weekly, and women $2.[193] Such scattered data as we possess indicate no marked change in American factory wages until the War of 1812. The small mills established before that event employed few operatives and paid them at the usual rate for village labor. Young boys, working fourteen hours a day, received 42 cents a week, and women received $1.[194] The pay of men was relatively higher, as an established market existed for their labor. Weavers received the same rate as when they wove homespun yarn for colonial households, and earned from 30 to 50 cents a day.[195] In 1817 the Boston Manufacturing Company at Waltham paid department superintendents $12 a week, machinists from $6 to $11, card-room employees from $2.50 to $16, most of the spinners $2.50, while weavers earned from $4 to $5. The earnings of mule-spinners in one instance reached $21.[196] Factory pay in America was in some cases lower than in Great Britain. Women and girls in the Waltham spinning-rooms averaged $3.23, while those in Manchester were paid from $2.50 to $3.75.[197] In many small mills wages were much lower. At Fall River carders and spinners were paid $2.33 a week and weavers $2.50. In 1820 woolen operatives at Peacedale received from $9 to $12 a month, which was the rate paid farm hands.[198]

According to a comparison of wages about 1825, in New England cotton mills mule-spinners earned from $1.08 to $1.40 and in Great Britain $1.02; while in woolen mills they earned $1.08 and 94 cents respectively. Hand-loom weavers earned 90 cents in America as compared with 74 cents abroad. Wages for women operatives were $2.50 and $3 in this country and were slightly under $2 in Great Britain.[199] In 1827 the weavers' society of Philadelphia reported that the average earnings of 5,000 or 6,000 hand-loom weavers, dyers, and warpers in that

[189] Finch, *Notes on Travel in United States*, quoted in *Documentary History of American Industrial Society*, VII, 48.

[190] *Documentary History of American Industrial Society*, III, 40, 104–107, 123; IV, 32, 67.

[191] Porter, *Progress of the Nation*, 414.

[192] Hartford Woolen Manufactory Co., *Manuscript Accounts*, 1790.

[193] Memorandum, in *Hamilton Papers*, Library of Congress.

[194] Bagnall, *Textile Industries*, 354; National Association of Cotton Manufacturers, *Transactions*, 1906, 231–232.

[195] Peck and Earl, *Fall River and Its Industries*, 17; *Bagnall Papers*, III, 1918.

[196] Boston Manufacturing Co., *Manuscript Accounts*, May pay roll, 1817; *cf.*, however, for Paterson, Cobbett, *Selections from Political Writings*, V, 481.

[197] *Tables of the Revenue, Population, Commerce, etc., of the United Kingdom*, 1832, Part II, 101; Table 97, in Great Britain, *Parliamentary Papers*, 1833, XLI.

[198] R. Hazard, *Peacedale Manuscript Account Books*, 1820.

[199] Allen, *Science of Mechanics*, 347; *cf.*, however, *Tables of the Revenue, Population, Commerce etc., of the United Kingdom*, 1832, Part II, 101, Table 97, in *Parliamentary Papers*, 1833, XLI.

city were $5 a week.[200] They remained at this rate some ten years longer, and then were forced down by the competition of power-looms, so that in 1846 they were said not to exceed $2.50.[201] The New York Convention of 1831 reported the average wage of cotton mill workers as $3 a week.[202] A year later the average weekly wages of cotton operatives in England were $2.57.[203] But mill-hands worked shorter hours in England than in America, where the factory day, like factory pay, as measured by farming standards.[204] In large Massachusetts and New Hampshire mills, where wages were highest, women and girls, between 1830 and 1860, earned from $1.75 to $2 a week in addition to board. Men received about $5 a week, and children between $1 and $2.[205] Wages were lower in Philadelphia than in Massachusetts, and lower in Virginia and South Carolina than in Philadelphia. In 1831 the New York Convention reported the average pay of men in Virginia cotton mills as $2.75 a week and in Massachusetts as $7; women received $1.58 in Virginia and $2.60 in New Hampshire. In 1849 a South Carolina manufacturer estimated that mill labor cost 20 per cent less in his State than in Massachusetts.[206]

Although mechanical improvements tended to raise average wages by displacing the very young children earlier employed for simple factory tasks, and by making higher earnings possible despite lower piecework rates, mill payrolls show little permanent rise, after 1830, in the wage level of textile workers in identical occupations. Women spinners whose average weekly earnings were $2.58 in 1828, received $3.45 during the prosperous years before 1837. After the panic their earnings fell below $3 in 1840, and to $2.63 from 1843 to 1850. Between 1828 and 1836 the weekly earnings of women weavers rose from $2.61 to $4.33; but they declined to $2.75 in 1840. Loom improvements helped them reach their 1836 level again ten years later. Male weavers earned about $1 a week more than women.[207] The census indicates that between 1850 and 1860, when California gold inflated prices, operatives' earnings rose 8 per cent in cotton mills and 24 per cent in woolen mills. Meanwhile hours of labor were shortened in many New England factories. According to the most complete investigation yet made, the wholesale price of a representative group of commodities in 1850 was 89.2 per cent of the price in 1860, and the average wages

[200] Hazard, *Register of Pennsylvania*, I, 28, Jan. 12, 1828, quoting Pennsylvania Society for Promoting Manufactures, *Report of June 25, 1827; cf.*, however, *Niles' Register*, XXXIV, 281, June 28, 1828.

[201] *Documentary History of American Industrial Society*, VIII, 238.

[202] New York Convention of 1831, *Journal*, 112: published as addendum to *Niles' Register*, XLII.

[203] *Tables of the Revenue, Commerce, Population, etc., of the United Kingdom*, 1832, Part II, 103, Table 1, in *Parliamentary Papers*, 1833, XLI.

[204] Montgomery, *Cotton Manufacture*, 174–176.

[205] McLane, *Report on Manufactures*, I, 583, 935, 977; Montgomery, *Cotton Manufacture*, 172; *Documentary History of American Industrial Society*, V, 66; *Reports of the Secretary of the Treasury*, VII, 620; a good study of women's wages is to be found in Abbott, *Women in Industry*, 268–295, 363–364; *cf.* Salem India Rubber Co., *Cash Book, 1836–1841, passim.*

[206] William Gregg, in *Hunt's Merchants' Magazine*, XXI, 672, Dec. 1849.

[207] Wright, *History of Wages and Prices in Massachusetts*, 268–271; *id.*, *Factory System of the United States*, 46–48.

in a representative group of occupations in 1850 was 90.5 per cent of their amount in 1860. Probably the purchasing power of wages was no more in 1860 than ten years earlier, though it was greater than during the hard times of 1840.[208]

Although with the rise of the factory system the earnings of women and children, which formerly were less than in British manufacturing districts, came to exceed wages in England, the difference was not so great as in the case of unskilled and artisan labor. The margin seldom rose above 20 per cent and seems not to have changed much after 1820.[209] British wages responded quickly to depressions, because operatives did not have recourse to other occupations and could not return to farm homes when factories closed. In America wages remained steadier, although the price of manufactures varied more than abroad. During the cotton crises between 1840 and 1850 wage fluctuations in American mills were about 20 per cent, while in English mills making corresponding goods they approached 50 per cent.[210]

ADMINISTRATION AND SUPPLY OF LABOR

The Waltham and Lowell corporations and other large textile companies in Massachusetts and New Hampshire pursued a policy in relation to their employees different from that of the mill-owners of Rhode Island, Connecticut, and the Central States. In Massachusetts few children were employed, wages were paid in cash, operatives were boarded at the houses of the company, and considerable control was exercised over their conduct and manner of life.[211] This policy was dictated by the need of assembling a large number of operatives, recruited from the native farming population, at points distant from their homes. To do this it was necessary to pay workers in cash, it was inconvenient to employ young children, and it was advisable to assure the young women respectable surroundings during their absence from home influences. In the main, the result was a higher standard of labor conditions in large New England textile towns than in small mill villages.

The Slater mills and their industrial descendants followed labor precedents borrowed from England. The comparatively few hands they at first required were found in their immediate neighborhood. They employed very young children. The first nine operatives engaged by Slater were 7 boys and 2 girls, between the ages of seven and twelve years.[212] At another early mill the force consisted of 9 boys and

[208] *Senate Doc.* 1394, 52d Cong., 2d sess., I, 9, 13; *Cyclopedia of Commerce*, II, 1586.

[209] It was estimated to be in all manufactures over 33 per cent; *Reports of the Secretary of the Treasury*, VII, 13.

[210] *Reports of the Secretary of the Treasury*, VII, 620; *cf.* however, Porter, *Progress of the Nation*, 446.

[211] Batchelder, *Cotton Manufacture*, 74–75; Miles, *Lowell*, 112, 182–184. The Waltham labor regimen seems to have been anticipated by predecessors of the Boston Manufacturing Co.; Massachusetts Historical Society, *Collections*, Ser. II, vol. III, 263–265.

[212] *American Wool and Cotton Reporter*, XIII, 1070; White, *Slater*, 98, 99; Bagnall, *Textile Industries*, 158, 159. *Cf.* a striking comment upon child labor in Slater's Mills in the "Account of a journey of Josiah Quincy in 1801," in Massachusetts Historical Society, *Proceedings*, Ser. II, vol. IV, 124; quoted also in Towles, *Factory Legislation of Rhode Island*, 9–10.

girls and 4 men overseers.[213] Moses Brown considered that this resulted in "near a total saving of labor to the country."[214] Whole families lived together in mill villages and were not boarded by their employers; therefore it was possible and convenient to pay these people in goods. Some early mills recruited child labor from almshouses and overseers of the poor, but this was nowhere so generally the custom as abroad, partly because there were few dependent poor in America.[215]

The operative population remained of native stock, with some recruits from Great Britain and Ireland. Mill-owners and foremen were often British manufacturers, and in the pioneer stage of each industry operatives from the old country controlled or conducted various processes. But English-speaking immigrants were so readily absorbed into the native population that they did not form a separate class. They were not discriminated against socially by other working people as are modern immigrants. Foreign labor received more encouragement in the Rhode Island mill group than at larger Massachusetts and New Hampshire factories. This may have been due partly to the greater variety of fabrics there manufactured and the early introduction of cotton printing. In 1826, of 612 operatives at Fall River, only 38 were foreigners, 28 of whom were employed in the printing works. But twenty years later Irish immigrants began to find employment in numbers, and by 1860 British and Irish operatives constituted a majority of the mill population in that district. As early as 1846 labor leaders complained that working conditions were more oppressive in Rhode Island than at Lowell and other New England centers, and that alien operatives were preferred by mill-owners because under the State Constitution they could not obtain the franchise and they were more submissive than native hands.[216] The displacement of Americans by foreigners was probably retarded in large mill-centers by the established boarding-house system and the consequent desire to keep a homogeneous working population, and by fear of losing more labor than would be gained if workers were recruited from European sources. In 1842, at Lowell, of 1,500 employees in the Merrimac mills, only 50 were foreigners. All of these were British or Irish, and most of the latter were sweepers and janitors.[217] So long as factory hands were drawn from farms, America had no operative class, except in a few large cities, such as New York, Philadelphia, and Pittsburgh. The average period of service in the New England mills was between

[213] *American Cotton and Wool Reporter*, XIV, 822.

[214] Letter of July 22, 1791, in *Hamilton Papers*, Library of Congress.

[215] *Niles' Register*, XV, 419, Jan. 30, 1819; Bagnall, *Textile Industries*, 193, 357; *American Wool and Cotton Reporter*, XIV, 169.

[216] *Voice of Industry*, Sept. 18, 1846, quoted in *Documentary History of American Industrial Society*, VII, 142.

[217] *Agent's Memorandum Book*, quoted in *Documentary History of American Industrial Society*, VIII, 148; Miles, *Lowell*, 182; North, *New England Wool Manufacture*, in National Association Wool Manufactures, *Bulletin*, XXIX, 325, Dec. 1899; Massachusetts, *Report on Hours of Labor*, 1845, 14.

four and five years.[218] Those who served a lifetime at this calling were mostly men whose special qualifications promoted them above ordinary employees.

From before the time Parliament forbade negroes to be taught hat-making in the colonies, these had been employed to some extent in mechanic arts. Colored shoemakers, tailors, and blacksmiths followed their trade from Pennsylvania southward. In 1796 a British traveler reported that all the furnaces and forges in Maryland were worked by blacks.[219] About the same time a Kentucky furnace advertised for negro hands, and "sprightly negro boys" were sought as apprentices in western nail factories.[220] Thomas Jefferson employed children on his plantation at the latter trade. Negroes were hired from their owners by Virginia tobacco factories and ironworks until 1860.[221] Slaves had spun yarn and woven cloth on plantations, and naturally were employed by early southern yarn mills. In 1782, at a little woolen manufactory in Virginia, 6 negro boys from thirteen to nineteen years old were engaged as weavers, and 4 negro girls as winders.[222] Negroes were largely employed at the Salem rope works in Massachusetts.[223] Small factories in Virginia, South Carolina, and Florida for a time used slave labor exclusively.[224] In Tennessee, Georgia, and elsewhere operatives were partly white and partly colored. However, from the beginning of cotton-spinning in the South, some mills used only white workers, and the most successful enterprise of this character followed the Lowell system of recruiting and administering labor.[225]

Although the immigrant contribution to the industrial population of the United States before the Civil War was small in quantity as compared with later years, its importance to the technical progress of industry was greater than at present. Immediately after the Revolution, if we are to believe the London papers of 1783, American agents were busy in that city and in the northern manufacturing towns, inducing artificers to emigrate to the States. Iron workers, glass-makers, and textile operatives were especially in demand.[226] But other causes than the inducements of agents promoted this immigration. One was the great distress that periodically prevailed in English manufacturing districts; another was the opportunity to acquire lands or to become factory proprietors in America. The expectations of these immigrants were not always realized. At times the steerage of English-bound

[218] *Cf.* Montgomery, *Cotton Manufacture*, 135, 137–138.
[219] Weld, *Travels*, 179.
[220] Advertisement, *Kentucky Gazette*, Nov. 1, 1794; Jan. 19, 1795.
[221] *Lynchburg Republican* and *Petersburg Democrat*, quoted in *Documentary History of American Industrial Society*, II, 72; Bruce, *Rise of the Iron Industry in Virginia*, Chap. v.
[222] *Documentary History of American Industrial Society*, II, 315–316.
[223] Bentley, *Diary*, IV, 382, Apr. 22, 1816.
[224] *Niles' Register*, XL, 281, June 18, 1831; XLI, 82, Mar. 31, 1832; *Hunt's Merchants' Magazine*, XV, 548, Dec. 1846; XVII, 323, Sept. 1847, XXIII, 575, Nov. 1850 XXV, 517, Oct. 1851; *De Bow's Review*, XI, 319–320, Sept. 1851.
[225] *E.g.*, *Niles' Register*, XL, 282, June 18, 1831; *DeBow's Review*, XVIII, 789, June, 1855.
[226] *London News*, quoted in *Providence Gazette*, Oct. 18, 1783.

vessels was crowded with disappointed working-people returning to their mother country. Such a movement naturally included the misfits in any new land, who overstocked the labor market in special pursuits and lowered wages to an equality with those of Europe. But among these industrial adventurers were others who became the pioneers of great enterprises, or who in a humbler way taught new arts and introduced new pursuits to our people. Nearly 100 glass-workers were brought from Bohemia and Thuringia to operate the works established at Fredericktown, in 1784, by a company of Bremen capitalists.[227] About the same time the glass house at Boston was manned by English foremen and assistants.[228] The infant industries of Pittsburgh were conducted largely by Scotch and English workmen.[229] In 1790 one of the most competent observers of our industrial progress wrote:

"A large proportion of the most skillful manufacturers in the United States are persons who were journeymen and in a few instances were foremen in the workshops and manufactories of Europe."[230]

From the time our first textile factories were started at Hartford, Beverly, and Providence, a continuous immigration of spinners and weavers ensued from northern England and Ireland.[231] Motives that now appear the reverse of patriotic sometimes promoted this migration. Before 1812, when manufactures in America received an impetus from the embargo and the prospective hostilities with Great Britain, many workmen from that country sought employment in the United States. In 1811 a single ship brought 100 weavers to New York from Ireland. The next year a notable immigration of cotton-spinners and other operatives occurred from the northern and western parts of England.[232] During the war the woolen mills that helped, though ineffectively, to clothe our armies, were manned by British operatives, and the duck that supplied sails to American privateers was woven in Massachusetts by Englishmen.[233] Even the business reverses that followed peace checked only temporarily this immigration of tradesmen, many of whom, during the subsequent industrial depression in England, came to America to enter farming, but eventually engaged in manufacturing. The traditions of British immigrants were as predominantly industrial as those of the native population were agri-

[227] Amelung, *Remarks on Manufactures; Hunt's Merchants' Magazine*, XXVIII, 513, Apr. 1853.

[228] *Massachusetts Laws*, 1793, Chap. 3; letter, Sam Breek, Sept. 3, 1791, in *Hamilton Papers*, Library of Congress; *cf.* also *Niles' Register*, XXVIII, 213, June 4, 1825.

[229] *Pittsburgh Gazette*, Mar. 2, 1799; Apr. 12, 1800. *Minutes of Evidence, Orders in Council*, 446–450, in Great Britain, *Parliamentary Papers*, 1812, III.

[230] Coxe, *View of the United States*, 443. For similar conditions in 1854, *cf.* Commission on the Machinery of the United States, *Report*, 58, in Great Britain, *Parliamentary Papers*, 1854—1855, L.

[231] Bagnall, *Textile Industries*, 158–159; letter of Elisha Colt, Hartford Woolen Manufactory, Aug. 20, 1791, in *Hamilton Papers*, Library of Congress; *American Wool and Cotton Reporter*, XIII, 1137; Wansey, *Excursion to the United States*, 68, 261.

[232] W. E. Lingelbach, in *American Historical Review*, XIX, 2, Jan. 1914; Howells, *Life in Ohio*, 4.

[233] *E.g.*, Bagnall, *Textile Industries*, 324, 339–340.

cultural, and this tended to differentiate their pursuits from those of the older residents, especially in the northern and eastern States.

Not only this working population, but also the special skill which it imported, was rapidly assimilated in America. That aptitude for mechanical pursuits which had been noted by Europeans in the colonists before they were independent facilitated the adoption of new industrial arts and their ready adaptation to local needs. Various causes have been assigned for the inventiveness and mechanical intuition which are sometimes regarded a national trait of our people. One early writer attributed it to freedom of vocation and absence of compulsory apprenticeship and industrial restraints;[234] another ascribed it to free-school education, adding that Americans possess "vivacity in inquiring into the first principles of the science to which they are practically devoted. They thus frequently acquire a theoretical knowledge of the processes of the useful arts, which the English laborers may commonly be found to possess after a long apprenticeship and life of patient toil. For this reason the American mechanic appears generally more prone to invent new plans and machines than to operate on the old ones in the most perfect manner."[235] Another observer at a later period noted that American workmen immediately "get into the system of those amongst whom they are thrown as mere learners. In this, as in other branches of industry, their minds being thoroughly prepared by education, they seem to seize upon and master even very difficult points in manipulation and construction, as it were by mere instinct. It is, however, more than probable that this rapidity of conception is unfavorable to that perfect and complete execution which is often characteristic of the more plodding and painstaking workman."[236] The strength and weakness of native workers is here designated. An English writer has said that invention is a normal function of the American mind; but it must be added that this mind was nurtured in an environment affording every suggestion and inducement to substitute machinery for men. In America the maximum utility of labor was obtained somewhere short of the point that would be most profitable in an older country. The very habit of thought that leads men to rely upon machinery makes them impatient of that assiduous application to craft details needed to produce the most finished goods. Probably the quality of mind here noted is as much a result of physical surroundings as of heredity or race, but its quick response to new ideas, and to physical contacts rather than to traditions and inherited processes, facilitated speedy assimilation of the industrial knowledge brought to America by foreign workmen.

[234] Blowe, *View of the United States*, 90.
[235] Allen, *Science of Mechanics*, 349.
[236] Wallis, *Special Report on New York Industrial Exposition of 1853*, 53; *cf.* also *id.*, 3–4.

CHAPTER XVI

TECHNICAL PROGRESS OF MANUFACTURES, 1790–1860

The essence of technical progress, 402. Water and steam power, 403. Transmission and speed, 411. Primary metal manufactures, 412. Reproductive metal manufactures, 416. Wood-working machinery, 421. Textile machinery, 422. Conclusion, 435.

THE ESSENCE OF TECHNICAL PROGRESS

Technical progress arises from the effort of industry to enlarge production, improve products, economize labor and materials, utilize new substances, and produce a greater variety of articles for consumption. The volume of production has been increased mainly by employing natural forces to drive machinery. The average quality of products has been improved by perfected mechanism and by scientific control of chemical processes used in manufacture. The best steel from a modern furnace may not excel that made in the primitive forge of some medieval armory, and the finest fabric of our looms may not surpass in uniformity and delicacy of texture the hand-woven muslins of India; but the average product of modern industry is superior to the average product of the craftsman period. Labor has been economized not only by substituting power machinery for hand work, but also by accompanying improvements in industrial organization. Engineering and chemical science, by supplanting empiricism, have made it possible to utilize former waste materials, to create new products by processes hitherto unknown, and to produce for ordinary consumption articles previously too rare for common use.

Great Britain, with command of vast markets in her dependencies and in foreign countries tributary to her commerce, had more incentive to increase the volume and variety of her manufactures than other nations. The broad consuming areas served by American factories also fostered wholesale and standardized production. Motives for economizing materials, including both natural forces and physical objects, were stronger abroad than in the United States, but motives for economizing labor were greater in this country.

At the close of the Revolution American consumption was limited in volume and variety by the small numbers and primitive wants of a frontier people. We have seen already that the subsequent rapid extension of domestic markets, by growth of population and betterment of living conditions, affected all phases of our manufacturing

development. In the eighteenth century the primary purpose of American power manufactures was to fit materials for profitable sale abroad. Sawmills, gristmills, furnaces, and forges were erected as much for this purpose as to supply local consumers. Beginning with the War of 1812, however, the use of power machinery and other devices for increasing production was encouraged mainly by growing home demands. All classes of manufactures responded to this impulse, but the real increase varied widely in different industries. The enlarged output of textile mills represented rather a transfer of manufactures from the home to the factory than an absolute growth of production. Though more yards of cloth were made per capita in 1840 than in 1790, the increase was not so great as manufacturing records suggest. Converted into pounds of wool, cotton, and flax used for each inhabitant, the increment of production would not be imposing. But in the case of metals we have to account with community rather then individual consumption, and it is to community consumption that the increased volume of manufactures most largely has responded. There was no transfer of iron-making from households to centralized establishments. This manufacture was transformed by a demand for more iron, in more forms, adaptable to more uses, and it presents the best example of technical progress in answer to the call for larger supplies of an industrial product. However, antecedent to all other advances in manufacturing technology was the perfection of prime movers, which diverted the immeasurable waste forces of nature to productive channels.

WATER AND STEAM POWER

Although steam was used in America to drive mill machinery as early as 1801,[1] this power became a dominant influence in transportation long before it did in manufactures. Until the middle of the century it affected but little the course of factory development. Meanwhile great advance was made in the utilization of water-power. The earliest feature of this progress was the construction of large dams and canals, which rendered available sources formerly uncontrolled and made possible the concentration of industries in manufacturing towns. This was followed by improvements in water-wheels that increased the amount of effective power obtained from a given source. Both phases of development, with accompanying betterments of general construction and design, helped to free water-driven plants from their earlier bondage to climate and enabled them to operate continuously throughout the year. New England, whose granite hills furnished no coal but many rapid rivers, for a long time used mainly these to turn machinery. Steam was more extensively employed in Pennsylvania and in the western lake and valley region, where absence of water-power was partly compensated by cheap fuel.

[1] Bishop, *History of American Manufactures*, II, 91.

The small mills that represented the first stage of American industrial development after the introduction of automatic machinery for the most part occupied sites already used in colonial times and required no important extension of these earlier improvements. On larger rivers wing-dams diverted sufficient water for the small wheels then in use, and sites utilizing an entire stream were confined to their headwaters and tributaries.[2] When broader markets and better command of technical conditions made large factories desirable and possible, more extensive powers were developed, which as they were near the sea also had access to wider areas of supply and distribution. By 1830 the smaller streams of New England were utilized to nearly their full capacity, and the distribution of water-using industries resembled that in England before the introduction of steam.[3] In Lancashire, about 1800, the Irwell River and its tributaries above Manchester furnished, within a distance of 25 miles, power for 400 manufacturing establishments.[4] Forty years later the valley of the Blackstone, between Worcester and Providence, contained 94 cotton mills, 22 woolen mills, and 34 machine-shops and iron works, employing over 10,000 operatives.[5]

The first attempt systematically to develop an extensive water-power for general manufacturing purposes was probably the conception of Alexander Hamilton, at whose initiative a company was incorporated by the State of New Jersey, in 1791, with extensive privileges, including a city charter over a district 6 miles square at the falls of the Passaic. This was the origin of the city of Paterson, and the primary purpose of the company was to utilize the water-power at this point. The undertaking failed after having leased several water privileges to manufacturers and having begun the spinning of cotton. But it was revived in 1807, and by the time Lowell was founded Paterson was already the seat of 12 cotton mills, 3 woolen factories, 3 machine-shops, and several foundries and minor industries.[6] However, Lowell was a more representative example of large water-power development for general industrial purposes.

About 1820 the project of utilizing the falls of the Merrimac, which were already driving small mills, and where a navigation canal had been previously constructed, was suggested by the success of the Boston Manufacturing Company at Waltham and was promoted by the proprietors of that enterprise. The original plan seems not to have embraced furnishing power for a number of establishments, but almost immediately it was widened in scope to include this larger

[2] Bagnall, *Textile Industries*, 390.

[3] The Woonsocket River ran 25 mills, and cotton mills were strung along its banks within less than a mile of each other; White, *Slater*, 260. The Singletary River had 7 mills in a mile and a half; *Bagnall Papers*, II, 1522–1530.

[4] *An Examination of the Cotton Factory Question.*

[5] *National Magazine and Industrial Record*, I, 61–62, June 1845; North, *New England Wool Manufacture*, in National Association Wool Manufacturers, *Bulletin*, XXXII, 107, June, 1902.

[6] Bishop, *History of American Manufactures*, II, 274.

purpose. As the result of several negotiations and transfers of property, the owners of the old canal were bought out and a new company organized, which sold or leased power to factories. At first the water-power and the site of the prospective city of Lowell were controlled by the Merrimac Manufacturing Company, the ownership of extensive real-estate holdings being a not unusual feature of early industrial organizations in New England. When the Locks and Canals Company was formed a few years later for the exclusive purpose of controlling the power and real-estate privileges at this point, its other functions were limited to erecting dams, digging canals, and building mills and mill machinery, operations which it performed cheaper than any competitor and which it sometimes made a condition of selling water privileges.

Though capitalized at only $600,000, the company's direct and indirect operations were very extensive and its profits large. Its land, bought for $20 or $30 an acre, was sold for as much as a dollar a square foot, and within a few years a city of 20,000 people grew up in what had been a farming district. Water-rights were sold by mill powers estimated at 3584 throstle-spindles, which was the amount of machinery carried at the Waltham mill, the parent company of the new organization. For a fee-simple right in a mill-power and a site for a factory the usual charge was $4 per spindle. This amounted to 4 acres of land and 54.5 horse-power for $14,336, or, after deducting the value of the ground, about $200 per horsepower.[7] By 1835 over 2,500 horsepower was in use, and about ten years later steam-engines were introduced to carry additional machinery.[8] In 1840 nine large textile mills were in operation, running 163,000 spindles and 4000 looms, and 5000 horse-power had been developed.[9] Around these factories had grown up numerous subsidiary industries and the largest machine-shop in the United States. Between this date and 1855 canal improvements raised the available horse-power to 9000 and the number of spindles and looms was more than doubled.[10]

During the twenty-five years following the founding of Lowell, two other large power developments were undertaken on the Merrimac, one in the vicinity of Manchester and the other at Lawrence. The latter enterprise was an offshoot of Lowell in the sense that it was promoted and financed by the same group of capitalists. Just a quarter of a century had elapsed since the negotiations began that resulted in the founding of the neighboring city. A company was organized that acquired sufficient land on both sides of the river, some distance below Lowell, to control the water-power there to be developed and the site

[7] Appleton, *Introduction of the Power Loom*, 28. Made payable in gold or silver by weight; *American Wool and Cotton Reporter*, XVI, 62.

[8] White, *Slater*, 255–256; *Bagnall Papers*, IV, 2572; *Farmer and Mechanic*, II, 9, Jan. 6, 1848.

[9] *Niles' Register*, LVI, 83, Apr. 6, 1839.

[10] *Hunt's Merchants' Magazine*, XXXIX, 672, Dec. 1858.

for a town. Within a year a granite dam, 1,629 feet long and 35 feet thick, with a fall of 26 feet, had been constructed across the river. Meanwhile several large factories, including probably the largest in the world at that time, had been erected. About 9,000 horse-power was developed, or three times the original power at Lowell. Water-powers were measured by the same method and sold for the same price as at the older city. Even a provision was repeated by which $5000, or slightly more than one-third the cost of each mill-power, should remain perpetually at 6 per cent interest, thus furnishing an annual rental to the town proprietors.[11]

The enterprises at Lowell and Lawrence were representative of numerous smaller untertakings, both in New England and elsewhere. At Manchester and Holyoke, and at Manayunk—now within the limits of Philadelphia—companies completed similar works for the purpose of selling or leasing power to factories.[12] For a time the Fall River Iron Works combined this function with its other varied industrial enterprises. Before Lowell was founded it was not uncommon for individual manufacturers and small firms to rent a dam or a portion of a water privilege from its proprietors. Ownership went with the land, and on large streams, providing they were not navigable, riparian rights on either side extended to the center of the river. These rights were clarified by a famous lawsuit at New Ipswich about 1825. The rise of power companies introduced no new principle of river control, and was only another phase of the incipient integration of industry and the association of capital under corporate forms for the larger undertakings which the growing needs of the country demanded.

The abundance and cheapness of water-power in America, like the abundance of other natural resources, at first retarded its economical application.[13] For a time an inexpensive wheel, transmitting a quarter or a third of the power applied to it, was more profitable than a more expensive installation utilizing twice that proportion. Until 1840 the principal manufacturing establishments in America used wooden pitchback wheels, which turned inward toward the fall, the water striking them just short of their highest point. The impact or kinetic energy of the stream was not utilized, the power being produced almost entirely by the simple weight of water in the buckets, which was retained until it reached the bottom by a stationary apron fitting as closely as practicable to the circumference. Eight such wheels, 30 feet in diameter, with buckets 12 feet long, propelled the machinery of the Merrimac Company. They utilized about three-fourths of the power applied to them.[14]

[11] *American Wool and Cotton Reporter*, XVI, 456.

[12] *American Textile Manufacturer*, I, 192, Nov. 1881; Hazard, *Register of Pennsylvania*, X, 165, Sept. 15, 1832; Bishop, *History of American Manufactures*, II, 153.

[13] Francis, *Lowell Hydraulic Experiments*, *xi.*

[14] Francis, *Lowell Hydraulic Experiments*, i; Appleton, *Introduction of the Power Loom*, 36; *Hunt's Merchants' Magazine*, XXXIX, 672, Dec. 1858. All-iron water-wheels were made in Massachusetts as early as 1821; *Worcester Spy*, Nov. 14, 1821.

Before they were practically used in America turbines had been studied experimentally for over a century and had reached their greatest perfection in France. They had been employed in America, but without permanent success, as early as 1790.[15] The Franklin Institute, to which American industries are indebted for many phases of technical progress, soon after 1840 published descriptions of these wheels which led to a series of experiments with them near Philadelphia. These experiments showed that turbines had become nearly or quite as efficient as the pitch-back type. In addition, they were more cheaply installed than the wheels in common use, occupied less space, turned with greater velocity, and were less impeded by back-water.[16] They aroused such interest that within a few years the government issued some 300 patents relating to them.

The first turbine used practically in New England was build by George Kilburn, a New Hampshire mechanic who had settled at Fall River. Upon suggestions received from France, and after inspecting a model deposited with the Franklin Institute, he constructed a wheel which was installed in the print works of Robeson & Sons, at Fall River, in 1843, and was in use continuously for many years until superseded by an improved wheel of the same type.[17] Prior to 1845 a turbine was in use also at the Quequechan mill, in the same city, but proved less efficient than the pitch-back wheels in neighboring establishments.[17] In 1844 Uriah Boyden designed a turbine of 75 horse-power for the Appleton Company at Lowell, which developed an efficiency greater than wheels previously in use. Two years later he constructed three turbines of 190 horse-power each for the same company, the maximum effective power of which was 88 per cent, or far greater than that of any predecessor. Within ten years wheels of this type displaced most of the pitch-back wheels at Lowell, being substituted for them as rapidly as the latter wore out, and they were introduced at once into the large factories at Lawrence. Their use added about one-fourth to the power available at those cities for propelling machinery. Turbine development of necessity waited upon improvements in metal-working, as these wheels were made of iron. The workmanship upon even the earliest of them was described as "of a delicacy and accuracy altogether unprecedented in constructions of this class."[18]

Although a French invention, the modern turbine owes its practical character largely to American engineers. Our makers standardized their wheels, establishing "models of different sizes, constructed in series, so that in place of requiring laborious and special study before installing each one, as was usual in Europe, turbines were built in

[15] *Columbian Centinel*, Dec. 1, 1790; *Massachusetts Magazine*, II, 703, Nov. 1790.
[16] Franklin Institute, *Journal*, 1843, XXXVI, 234, 289, 370, 377; *Bagnall Papers*, III, 1844–1847.
[17] *Bagnall Papers*, III, 1845, 1847, 1894–1895.
[18] Francis, *Lowell Hydraulic Experiments*, 2–4.

advance in great quantities and at a low price, with practically no variations in their efficiency, and adaptable to any fall and current." Ultimately the Holyoke Power Company, after developing all the 30,000 horse-power which the Connecticut River at that point afforded, found itself unable to supply the increasing demands of neighboring factories. This caused it to erect an experimental plant to measure precisely the amount of work obtained from various motors, and resulted in great improvements in turbines.[19] Within half a century the American policy of water-power utilization changed from one of extravagant and unscientific uses to one of systematic and studied economy.

Until 1840 the motive machinery of the largest factories, and the methods of transmitting power to factory mechanism, would have been understood easily by a colonial millwright, who would have discovered in these few principles with which he was not familiar. But the introduction of turbines was the first step toward the modern hydraulic plant, which, in its fuller development, is an industrial creation following the Civil War. Its engineering features are so different from those of early water mills that they would be as incomprehensible to the millwright of 1800 as the steam-engine and the dynamo.

Steam had been used for pumping mines in New Jersey and Rhode Island for thirty or forty years when its application to other purposes began at Philadelphia.[20] Probably the first engines used to drive mill machinery were in operation before 1803 at a sawmill in New York and at a small establishment for grinding plaster of paris in Philadelphia.[21] The difficulty of working metal to exact machine dimensions hampered the early development of these motors. In those first constructed the lever beams, the arms and shafts of the fly-wheels, the bearings upon which the fly-wheels were supported, the hot-water and cold-water pumps, the cold-water cistern, and even the steam-boilers, all were made of wood. Boilers were rectangular chests, of bolted white-pine planks 5 inches thick, braced with oak scantling 10 inches square. Inside the chest was a cast-iron fire-box with vertical flues through which the water circulated.

Within a few years, however, iron boilers became universal.[22] Two general designs of engine early came into use: the low-pressure

[19] Exposition Universelle Internationale de 1900 à Paris, *Rapports du Jury Internationale, Group* IV, *classe 20,* 151, 152, 153; *Cassier's Magazine,* IX, 77–78, Nov. 1895.

[20] See 223–224, preceding. *Bagnall Papers,* I, 197; American Institute of Mining Engineers, *Transactions,* 1876–1877, V, 168–173; Rhode Island Society for Encouragement of Domestic Industry, *Proceedings,* 1861, 104; Nelson, *Josiah Hornblower and the First Steam Engine in America,* 12–15.

[21] Bishop, *History of American Manufactures,* II, 91; Charles E. Emery, *Report on Pumping Engines,* in U. S. International Exhibition, 1876, *General Report, Judges Group,* XX, 11. There are references to early steam-engine experiments in William Bentley's *Diary,* I, 141, Feb. 6, 1790; *id.,* 361, Apr. 7, 1792.

[22] U. S. International Exhibition, 1876, *General Report, Judges Group* XX, 12–13. Wooden boilers were used on steamboats until 1817. Copper boilers also were used; Essex Institute. *Historical Collections,* L, 194, 199, 201; *Business Life of Paul Revere, Anno. 1808.* A tubular iron boiler was built at Hoboken in 1804: Franklin Institute, *Journal,* LXII, 147, Aug. 1871.

Bolton and Watts type, imported from England and also manufactured in America, and the high-pressure type, made by Oliver Evans of Philadelphia, which competed actively with the former and was regarded in some respects superior to it. As wood was cheaper in America than in Europe, the latter, more wasteful of fuel but simpler to build, became the usual design in this country, while low-pressure engines were employed more extensively abroad. Early in 1812 Evans had 10 engines in use, widely distributed throughout the country—1 in Florida, 2 in Louisiana, 1 in Mississippi, 1 at Marietta, 1 at Lexington, 2 at Pittsburgh, 1 at Middletown, and 1 at Philadelphia.[23] The same year an Evans engine was installed in a woolen mill at Providence. Those in the South and West were used to saw timber and to grind white lead and grain. The one in Connecticut drove all the machinery of the largest woolen factory in the country. These engines, from 10 to 25 horse-power, sold for $6,000 and were warranted to grind 240 bushels of grain or to saw 5000 feet of boards in a twelve-hour day. In 1817 a cotton factory, a woolen factory, and wire works at Pittsburgh were propelled by steam.[24] By this time engines were manufactured at Pittsburgh, Louisville, and Cincinnati, as well as in eastern cities.[25]

No statistics exist showing the amount of steam-power used in manufactures prior to the Civil War. The census of 1820 incidentally mentions about a dozen plants so operated, including a woolen mill in New York, 1 in Pennsylvania, 2 paper mills, and 2 iron works.[26] In 1831 all the 124 mills recorded in New England, outside of Massachusetts and Rhode Island, were run by water. Of 169 plants in Massachusetts, 39 used steam, but 32 of these were printing-offices. In Rhode Island 128 textile mills used water and 4 used steam. The water-wheels of that State developed 12,000 horsepower and the steam-engines 800.[27] Practically all of the factories enumerated in New York and New Jersey used water, but in Pennsylvania 57 out of 161 plants were propelled by steam.[28] These included 4 cotton and 2 woolen factories and numerous rolling mills and forges.

Evidently, therefore, during the first third of the century the location of manufacturing establishments, their size, and their relation to markets, were determined primarily with reference to water-powers. But engines had been called in to supplement the latter, especially in iron works, glass factories, bleacheries, and print works, where heat already was required for other processes. Some industries found the convenience of location in large cities more important than extra cost

[23] *Niles' Register*, I, 406–407, Feb. 1, 1812; III, 110–111, Oct. 17, 1812, and addenda to volume III; also summarized by Bishop, *History of American Manufactures*, II, 180, note.

[24] Philadelphia Society for the Promotion of National Industry, *Addresses*, 242.

[25] McLane, *Report on Manufactures*, II, 239; *Niles' Register*, XV, 112, Oct. 10, 1818; McMurtrie, *Sketches of Louisville*, 131; *cf.*, Hunter, *Study of the Iron Industry in Pittsburgh*, 13.

[26] *American State Papers, Finance*, IV, 87, 88, *et. seq.*

[27] McLane, *Report on Manufactures*, I, 927.

[28] McLane, *Report on Manufactures*, II, *passim; cf.* Bishop, *History of American Manufactures*, II, 301.

of power. By 1822 steam was used in Louisiana sugar mills.[29] In 1830 Cincinnati works annually made more than 100 engines, mostly for steamboats.[30] Two years before this Pittsburgh makers received orders for 8 steam plants for woolen mills and in 1833 the latter city had 90 engines in operation, aggregating over 2600 horse-power. Most of these were in iron works, but 7 were in textile mills, 6 in glass works, and 10 in woodworking establishments.[31] Of 35 factories of various sorts at Steubenville, 14 used this power.[32] Steam textile mills were erected in the West because they had cheap coal and could utilize the labor of women and children from families those heads were employed in other industries. Before 1850 such mills, running from 10,000 to 20,000 spindles, were in operation at various points between Pittsburgh and St. Louis,[33] and engines made in the former city were spinning cotton in North Carolina and Alabama.[34]

A rotary engine was used in 1841 to run a newspaper press in Boston, and six years later a steam turbine ran a small sawmill in Tennessee,[35] but neither these devices nor internal combustion nor hot-air engines passed the experimental stage before the Civil War. Great improvements were made in reciprocating engines, but they failed to reduce the direct cost of steam to that of water. By 1839, at Easton, Pennsylvania, a point accessible to coal, the relative annual cost per horse-power for water and steam was $23 and $105, and at Lowell it was respectively $12 and $90.[36] Water-power was cheaper in America than in Great Britain, but steam was twice as expensive in New England as in the older country. Yet the prime cost of the two powers tended to approach each other. The first steam-engines cost nearly as much as a complete water-driven factory, but their price quickly fell to par with other machinery. Technical difficulties soon ceased to be an obstacle to the use of either power. Even in New England steam factories eventually were able to compete with water-driven rivals. From 1831 the Eagle Cotton Mills, at Olneyville, operated entirely by steam, were so successful that during the next fifteen years their capacity was trebled.[37]

Between 1840 and 1850 a controversy arose in New England as to the relative economy of steam and water in textile mills. It was

[29] *Cincinnati Advertiser*, quoted in *Niles' Register*, XXXVIII, 293, June 12, 1830.
[30] Bishop, *History of American Manufactures*, II, 346.
[31] *Niles' Register*, XXXII, 161, May 5, 1827; *Pittsburgh Gazette*, quoted in Hazard, *Register of Pennsylvania*, XII, 314; *cf. Niles' Register*, XLV, 165, Nov. 9, 1833.
[32] *Niles' Register*, XLV, 210, Nov. 30, 1833.
[33] Gregg, *Pittsburgh, Her Advantageous Position*, 12; *Hunt's Merchants' Magazine*, XX, 113, Jan. 1849; XXIV, 513, Apr. 1851; Webber, *Manual of Power*, 60.
[34] These commissions began to reach Pittsburgh by 1829; *Niles' Register*, XXXVII, 117, Oct. 17, 1829; XLIV, 131, Apr. 27, 1833.
[35] *Boston Patriot*, quoted in Hazard, *U. S. Register*, V, 56, July 28, 1841; *Scientific American*, III, 390, Aug. 26, 1848.
[36] *Report of Lehigh Coal and Navigation Co.*, 1839, in Hazard, *U. S. Register*, II, 156, Mar. 4, 1840; Montgomery, *Cotton Manufacture*, 214–217.
[37] *Bagnall Papers*, II, 1446–1447; IV, 2423.

claimed also that machinery driven by steam could be operated at more uniform speed and a finer grade of goods produced than by water-power.[38] About this time large steam cotton factories were erected at Portsmouth, Newburyport, Salem, and Providence, partly to employ the surplus capital and labor of those cities, partly because of their access to raw materials and markets, and partly because New England industries were beginning to outgrow the water-power at their disposal. This demand for more power and for better control of machinery hastened the development of the turbine and of concomitant devices for governing the speed of water-wheels, which assisted water to compete successfully with steam and for a time to gain upon its rival. But the full utilization of the water-power of the country awaited the discovery of electric transmission, which made it possible to place that power in markets distant from its origin. Meanwhile improved transportation, by lowering the cost of coal, extended the area within which steam could be used with profit.

TRANSMISSION AND SPEED

Until the beginning of the century power was transmitted from water-wheels to mill machinery by wooden shafts and cogwheels. This was the plan proposed in 1791 for the Paterson works.[39] Shafts and gears continued to be used in Great Britain, but in the United States were soon replaced by belts. Ropes were used to some extent in England to carry power from main shafts to mules and spinning-frames.[40] Apparently belts were unknown to Slater, in 1790, when he built the first cotton machinery in Rhode Island.[41] Three years later Eli Whitney included elementary directions for their use in his specifications of the cotton gin.[42] But at a comparatively early period Americans adapted belt transmission from prime movers to factory machines. About 1830 their superior economy to the best gearing made in this country was demonstrated at Fall River.[43] In 1840 machine-cut spiral gears, were used in our factories to drive fliers and other quick-moving parts of textile machinery.[44]

Such power machines as were used in America in the eighteenth century were slow-moving. Ponderous and deliberate water-wheels turned leisurely mill-stones and sash-saws. High-speed mechanism came with textile machinery, even though spindles then moved much more slowly than today. The adjustment of reciprocal velocity be-

[38] C. T. James, in *Hunt's Merchants' Magazine*, XXI, 500, Nov. 1849; *cf. id.*, 633; XXIII, 193, Feb. 1850; Batchelder, *The Cotton Manufacture*, 91–92.
[39] "Project of Spinning Machinery," *Hamilton Papers*, in Library of Congress.
[40] Baines, *History of Cotton Manufacture*, 206.
[41] Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1861, 102.
[42] Original Patent Specifications, in Tompkins, *The Cotton Gin*, 32–33.
[43] Peck and Earl, *Fall River and Its Industries*, 24; Montgomery, *Cotton Manufacture*, 24–25.
[44] Montgomery, *Cotton Manufacture*, 68–69.

tween part and part, as in case of drawing-heads and spindles and in the various operations of looms, introduced questions of gearing and transmission that previously had no practical importance; and their solution revealed new mechanical possibilities.[45] A New England apprentice accidentally ascertained that a tin disk revolving with great rapidity would cut quickly into a bar of iron.[46] The same principle applied to circular saws multiplied the output of sawmills. In all cutting and abrading processes, for wood or metal, a new mechanical practice, realized through transmission, thus became common. A Connecticut mechanic discovered that brass plates, spun at high velocity under pressure, could be shaped around molds into almost any form, and thus opened a new era in this department of metal-working.[47]

PRIMARY METAL MANUFACTURES

Although in Great Britain, between 1790 and 1830, smelting furnaces were enlarged, steam blowing machinery introduced, average output increased, and coal and coke substituted for charcoal, in America primary processes of iron-making advanced but little. The Pennsylvania Society for Promoting Industrial Improvements asserted, in 1825, that furnace practice had made no progress for thirty years and that the use of mineral fuel for smelting was unknown.[48] Old colonial furnaces still remained in operation, and those built more recently copied these predecessors in design and methods. Annual runs of 2,400 tons of pigs were made before 1800—a product seldom exceeded for half a century.[49] Since charcoal only was used for smelting, the need of economizing fuel forced most American iron-masters to depend on water-power. These conditions delayed the erection of larger plants and the adoption of improved blowing-engines, and fostered a conservatism that hampered technical progress.

Between 1830 and 1850 the introduction of hot blasts and mineral fuel, and the wider use of puddling and rolling for refining, increased furnace capacity, economized labor, caused the extension of individual establishments, and, as we later shall see, led to new phases of industrial organization. In the fall of 1825 iron was smelted at a Pennsylvania furnace with anthracite coal, alone and in combination with charcoal; the attempt was successful experimentally, but apparently not commercially.[50] Five years later Frederick W. Geissenhainer, a German-American iron-master, successfully smelted iron ore with anthracite coal at a laboratory furnace in New York City. He was

[45] E. G. Arnold's compound gear: National Association of Wool Manufactures, *Bulletin*, IX, 33, Mar. 1879.

[46] *Niles' Register*, XX, 406, Aug. 25, 1821.

[47] Lathrop, *The Brass Industry of Connecticut*, 55, 108.

[48] Swank, *Iron in All Ages*, 365.

[49] *E.g.*, at Sterling Furnace; Crèvecœur, *Voyage dans la Haute Pensylvanie*, I, 285; cf., however, Page, *New Hampshire Iron Company*, 5.

[50] *Niles' Register*, XXIX, 262, Dec. 24, 1825; *cf.* Swank, *Iron in All Ages*, 353.

granted a patent for his discovery in 1833, and shortly afterwards began the commercial manufacture of iron by this process.[51] Meanwhile the same method was discovered independently in Wales. British promoters purchased the American patent, and its general adoption in this country immediately followed. The new fuel came opportunely to help domestic producers supply a larger share of the great market for iron created by railway development.

About the same time soft coal and coke also were employed for smelting. Their use, common in Great Britain for many years, was deferred in America by the abundance of charcoal, the conservatism of iron-masters, a prejudice in favor of charcoal iron, and lack of good coking coal, and by the fact that suitable soft coal did not, like anthracite, lie immediately tributary to developed iron mines and established furnace districts. Moreover, soft coal did not stand land-carriage so well as anthracite.[52] Between 1837 and 1840, however, following early experiments elsewhere, coke was used successfully at several furnaces in western Maryland.[53] Its introduction in the trans-Appalachian country followed rapidly, and it was soon supplemented by the direct employment of soft coal at Ohio furnaces.[54] However, until the Civil War anthracite was the more important smelting fuel. The two combined, though they did not displace charcoal, created a new era in American iron-making and assured our ultimate independence of foreign furnaces for this metal.

The use of anthracite was made possible by the hot blast, which was discovered in Scotland in 1829 and adopted in America five years later. In 1836 means were devised for heating the blast directly by the furnace flame at the tunnel head. This raised the temperature to 500°, increased furnace product 40 per cent, and saved about the same proportion of fuel. Soon after 1840 hot-blast ovens were introduced and the furnace gas was conducted to them before igniting. This further economized fuel and made possible a hotter blast.[55]

Coal smelting accelerated the adoption of steam motors and improved blowing-engines. The old water-driven furnace, with leather bellows, wooden blowers, or a water blast, disappeared except in isolated localities. In the Champlain district and in Alabama the hot blast was eventually used even by bloomeries.[56] About 1852 a Pennsylvania iron-master, by doubling blast pressure, greatly increased his

[51] Swank, *Iron in All Ages*, 354–355; 374; French, *History of the Iron Trade*, 58; Niles' Register, L, 395, Aug. 13, 1836; LIII, 32, Sept. 9, 1837; LIII, 164, Nov. 11, 1837; LVII, 256, Dec. 14, 1839; LVII, 313, Jan. 11, 1840.

[52] Johnson, *Notes on the Use of Anthracite*, 10.

[53] Swank, *Iron in All Ages*, 370.

[54] *E.g.*, Whittlesey, *History of the Coal and Iron Business of Cleveland.*

[55] Swank, *Iron in All Ages*, 452; *cf.* Stephen Caldwell's deposition, in Pearse, *History of Iron Manufacture in America*, 60. There was not a hot blast in Pittsburgh as late as 1854; Fritz, *Autobiography*, 125; *cf.*, however, *Hunt's Merchants' Magazine*, XVII, 216, Aug. 1847.

[56] Swank, *Iron in All Ages*, 142; *Story of Coal and Iron in Alabama.*

product, and high blasts gradually became a feature of American practice.[57]

Such advance as was made in smelting lead copper, and zinc, the only industrial metals except iron produced in America, was relatively unimportant.[58] The technical progress of primary furnace industries thus was confined mainly to increasing iron output. Before 1860 record runs had risen to over 300 tons a week.[59] The pigs were no better than those made in colonial furnaces of one-twelfth this capacity, and labor economy was incidental to enlarged production rather than a motive for it. Development responded to one dominant influence—the enormous new demand for iron created by the use of steam in transportation and manufactures.

The same motive governed the progress of iron refining. But while furnace production was increased by employing a new fuel, refining output was enlarged by saving labor. Until 1860 wrought iron continued to be made directly from the ore in bloomeries, and indirectly from pigs in refining forges, by processes that had been used for centuries.[60] These hammered bars served many purposes now filled by steel. They were softer than steel, and more easily worked and welded, qualities appreciated when metal-working machinery was imperfect and implements frequently were repaired by their owners. But the method of refining this iron was laborious and discontinuous. In order to deprive them of excess carbon, pigs were reheated several times in direct contact with fuel and usually underwent equally numerous drawings under the hammer. These proceedings were slow and required repeated transfers of metal between forge and anvil. In 1817 the puddling and rolling process, a continuous method of refining invented in England more than thirty years before, was introduced in America.[61] Pig-iron was decarbonized in a modified air-furnace out of contact with fuel, and without any reheating was passed through a squeezer to expel the cinder and then rolled into bars. Doubtless this method, on account of its superior economy, would have immediately displaced the older process of refining had not rolled bars for many years been inferior to those made in forges. Its general adoption in the United States was retarded further by British competition. However, soon after 1840 changes in furnace treatment during refining, which forecast remotely the open-hearth steel process, resulted in a better product, and improvements in squeezers and rolling mills again reduced the cost of production.[62] Almost simultaneously with these advances, the

[57] Swank, *Iron in all Age*, 455.

[58] Zinc was smelted near Bethlehem in 1859; Nathan Trotter & Co., *Inland Letter Books* (Oct. 20, 1859, Oct. 31, 1861.)

[59] *Hunt's Merchants' Magazine*, XXXIV, 126–127, Jan. 1856; Swank, *Iron in All Ages*, 455 In 1857, the largest furnace product for a single year was 9,300 tons; American Iron Association, *Bulletin*, 1857, 61.

[60] *DeBow's Review*, XXIV, 464–465, May 1858.

[61] Swank, *Iron in All Ages*, 217, 461. Its adoption had been urged many years before; *cf. American Museum*, II, 261; *Letter to the Directors of the New Hampshire Iron Factory.*

[62] Fritz, *Autobiography*, 50–51, *Mineral Industry*, IV, 448; Overman, *The Manufacture of Iron*, 259–276.

increased output of domestic furnaces made possible—and the demand for rails made exigent—larger supplies of rolled iron and caused a rapid extension of puddling in America.

Cast-iron and wrought-iron were terms meaning the same a century ago that they do today, but steel has acquired new significations. Formerly it indicated a high-carbon metal capable of receiving temper. Modern low-carbon steel, such as is used for rails and structural purposes, probably would have been classed by our ancestors as a variety of iron. Its place in the industrial market until the Civil War was filled by the product of the rolling mills just mentioned. Little progress was made in the technology of high-carbon steel during the first half of the century. Scientific study of the structure and composition of iron as yet had little influence on manufacturing procedure even abroad, and American furnacemen were prejudiced strongly against theorists meddling in their industry. Some American steel was made, as during the previous century, by cementation. It could be employed for agricultural implements and other less exacting purposes, but was inferior to imported steel and not adapted for finer uses.[63]

Cast steel was manufactured sporadically at several places. It was made continuously at Cincinnati for some years prior to 1837.[64] Soon after this crucible-steel works, destined to be permanent, were established at Jersey City and Pittsburgh.[65] The difficulty of procuring heat-resisting materials for melting-pots was long an obstacle to success. A greater difficulty, however, and the one that explained the inferiority of American to European steel, lay in the uncertain quality of domestic iron. Little positive knowledge of its chemical composition existed. It entered the market from many widely separated sources. It was not, like the iron of Sweden and Great Britain, a standardized product; therefore, the quality of steel made from it was a matter of hazard. The modern Bessemer and open-hearth processes were not adopted in America until after 1860. The former discovery shortly antedated that year; the latter belongs to a later period. However, about 1851 the peculiar principle of the Bessemer method, that distinguishes it from other processes, was discovered independently by William Kelly, a Kentucky iron-master, who invented a way of decarbonizing molten furnace metal by forcing air through it. He thus produced a low-carbon iron, used mostly for boiler-plates, that resembled in many respects the product later known as Bessemer steel.[66] But he and his assistants had no knowledge of the chemical reactions which their process involved; consequently they were unable to control the quality of their product

[63] New York Convention of 1831, *Journal, Report on Iron and Steel*, 29.

[64] Swank, *Iron in All Ages*, 385–388.

[65] Swank, *Iron in All Ages*, 389–391; *Niles' Register*, XXXVII, 178, Nov. 14, 1829; XLII, 370, July 21, 1832; *Hunt's Merchants' Magazine*, XX, 678, June 1849; Whitworth, *Special Report on New York Industrial Exhibition of 1853*, 8; Adirondack Iron and Steel Co., *Report, 1850*, 32–36.

[66] Pearse, *History of Iron Manufacture in America*, 169; Lesley, *Iron Manufacturer's Guide*, 129; *Scientific American*, XIII, 256, Oct. 21, 1865; Swank, *Iron in All Ages*, 397–399.

by selecting proper metal to make it uniform, and they did not develop the details of their method in the direction which eventually gave it importance.

REPRODUCTIVE METAL MANUFACTURES

Air and cupola furnaces for remelting iron, of the type erected in America before the Revolution, remained essentially unchanged in principles of construction and operation until 1850. About that time the management of cupolas was facilitated by the drop-bottom, which is said to be an American invention.[67] The maximum furnace capacity until after 1860, was 10 or 12 tons an hour. This country made relatively faster progress in the manufacture of small than of large castings, because peculiar fields of demand for the former existed among American consumers.

Following the substitution of iron for wood in steam-engines came its employment in other large machinery. Though as late as 1840 the framing of American textile machines was frequently of wood, the substitution of cast iron for this material dated from the introduction of power-looms. In 1820 Worcester and Fall River founders were making castings for the latter, which sometimes were designated as iron-side looms.[68] Two years later a Worcester maker began to cast cylinders for cards, making them in four parallel pieces.[69] With the introduction of turbines came a demand for cast iron pipes, shafts, and casings. It is said that improvements in casting were "contemporaneous with and made possible this new design of water-wheel."[70] For many years castings were used for machine parts for which forgings later were employed. During this period steam-engines were confined partly by this fact to the slow-running, double walking-beam type.

In heavy machine parts, girders, and columns the transition has been from wood to castings, from castings to wrought iron, and from wrought iron to steel. But the foundry, on the other hand, invaded the field of the forgeman in smaller metal machine parts. America early developed unusual skill in making light, strong, and ornamental castings. This was due partly to the wide use of stoves. These required thin, strong, irregular shapes, with careful allowance for even shrinkage in cooling. About 1850 malleable iron came into use, castings of this metal supplanting forgings for certain parts of firearms, tools, textile machinery, garden implements, and harness furniture.[71] Following this the invention of the sewing-machine created a great demand for finely finished, interchangeable cast parts. Stoves and sewing-machines

[67] Kirk, *The Cupola Furnace*, 11.

[68] *Bagnall Papers*, III, 1922; Advertisement of William Bacon, of Uxbridge, in *Worcester Spy*, May 17, 1820; Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1861, 89; *cf.*, however, Montgomery, *Cotton Manufacture*, 110.

[69] *American Wool and Cotton Reporter*, XVI, 816; *Worcester Spy*, July 10, 1822.

[70] New England Cotton Manufacturers' Association, *Proceedings*, 1901, No. 71, pp. 268–269.

[71] *Worcester Spy*, Oct. 17, 1839; May 7, 1851; Wallis, *Special Report on New York Industrial Exhibition of 1853*, 43, 44; Adirondack Iron and Steel Co., *Report, 1850*, 36.

were articles of household furniture, and their extensive manufacture and use in America stimulated the development of artistic metalwork in this department and improved the general technique of molding.[72]

In the production of small castings, such as those just described, and builders' hardware, labor was an important element of cost. This caused the invention of labor-saving devices, which represented a principal contribution of America to this branch of metal-working. Such inventions were not confined to iron-founding. Their most interesting and typical application was in the manufacture of glass, where molding machinery was substituted for blowing and cutting, and created a virtually new industrial product.[73] This process so cheapened glassware as greatly to extend its use for domestic and other purposes. To the same class of inventions belongs type-founding machinery, which also originated in this country and added to the product of labor eight or ten fold.[74] By 1860 American methods of handling and pickling castings were reported better than those in England, and foundry practice probably equaled that abroad.

Anchors, axes, and shovels, as in colonial days, continued mainly to employ American forges until well towards the middle of the century. So long as the latter were operated by water-power, plants expanded by multiplying units rather than by increasing each unit's capacity. In 1835 the Ames Works employed 9 four-ton tilt-hammers to make 40 dozen shovels daily; twenty years later they employed 26 trip-hammers, run by a steam-engine and 37 water-wheels, to make 200 dozen shovels daily.[75] Small hammers could handle the forgings attempted in America before the use of steel for large machine parts, because these parts—even though of considerable size—could be built up by welding. The day of giant machinery was postponed until after the Civil War, when steel, which must be forged from a single ingot, supplanted iron. Until that event a six-ton Nasmyth steam-hammer, itself a recent introduction from England, and a Condy hammer of 7.5 tons were the most powerful appliances used in American shops for working metals.[76]

Some important devices for machining iron originated in the United States. The slide lathe was an American invention.[77] Filing-jigs, milling-machines and gear-cutters originated independently in the United

[72] *Scientific American*, XVI, 301, May 11, 1867; Committee on the Machinery of the United States, *Report*, 58, in Great Britain, *Parliamentary Papers*, 1854–1855, L.

[73] Bishop, *History of American Manufactures*, II, 389–390; Royall, *Travels*, II, 125; *Farmer and Mechanic*, II, 140, Mar. 23, 1848; *Hunt's Merchants' Magazine*, XXVIII, 379, Mar. 1853; Wallis, *Special Report on New York Industrial Exhibition of 1853*, 56.

[74] Chevalier, *Lettres sur L'Amérique du Nord*, II, 38; Wallis, *Special Report on New York Industrial Exhibition of 1853*, 26; *Hunt's Merchants' Magazine*, XXXIX, 633, Nov. 1858; Bishop, *History of American Manufactures*, II, 209, 332.

[75] *Niles' Register*, LXVIII, 77, Apr. 4, 1835; *Hunt's Merchants' Magazine*, XXXIV, 128–129, Jan. 1856.

[76] *Cf.* 506, Note 10, following; *Boston Commercial Bulletin*, Mar. 29, 1862.

[77] Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1861, 106–108.

States, although their use in this country may have been preceded or accompanied by similar inventions elsewhere.[78] Many new devices were contrived to meet the exigencies of the numerous small shops for making textile machinery scattered through New England.[79] The printing-press works of Hoe & Co., in New York, also were the home of similar improvements. Some of these evolved from very crude beginnings. The first plane for finishing the bedplates of iron presses was constructed on the plan of a gigantic carpenter's plane, weighted down by 3 or 4 men who stood upon it, and drawn over the iron by a chain and windlass.[80] Though America was fertile in engineering ideas, England was a better place to develop them and to put them in practical use.[81] Therefore this country imported metal-working machinery from Great Britain and remained in engineering tutelage to the older country. A representative of the British Government, who visited the larger shops of the United States in 1853, reported that the engine tools used in America were generally similar to those employed in England some years previously, being lighter and less accurate than those then in use abroad, and turning out less work. The proportion of slide to hand lathes was greater than in English workshops. Planing and drilling machines were in common use, but there were few horizontal or vertical shaping machines, and considerable hand labor was expended on work performed mechanically in the older country.[82]

These early differences in national machine practice are explained partly by the fact that American machine-tools which originated in New England were adopted to light, uniform work, such as the manufacture of textile-machinery and other mechanism requiring small and interchangeable parts. These necessitated no heavy cutting and encouraged the use of pointed tools with a fine feed. Castings were pickled, so there was no scale, and forgings were drawn so accurately that little needed to be cut away in subsequent operations. Files and emery were used for finishing, which accounts for the relatively extensive use of hand labor in some American shop processes. In Great Britain, on the other hand, engineering requirements demanded heavy, strong tools, with powerful gearing, high speed, water cutting by broad cutters, and a coarse, rapid feed. Such machines made truer surfaces and saved time on large work, obviating hand finishing with files and emery. The New England system was best adapted to the manufacture of firearms and light mechanism of the kind

[78] North, *Simeon North*, 84; *cf.* Bentley, *Diary*, IV, 152–153, Feb. 19, 1813.

[79] *E.g.*, *Farmer and Mechanic*, II, 33, Jan. 20, 1848; *DeBow's Review*, XVI, 9, Jan. 1854.

[80] *Bagnall Papers*, I, 611–612; *cf.* account of 14-ton steam planer in *Worcester Spy*, June 4, 1851. Planers were not used at Cambria in 1849; Fritz, *Autobiography*, 60; *cf.* Great Britain, *Parliamentary Papers*, 1841, VII, 205, question 3026.

[81] Great Britain, *Parliamentary Papers*, 1841, VII, 113, question 1556.

[82] Whitworth, *Special Report on New York Industrial Exhibition of 1853*, 8. The positive achievements of American machinists were more fully recognized by other British investigators; Committee on the Machinery of the United States, *Report*, 32, in Great Britain, *Parliamentary Papers* 1854–1855, L; *cf. id.*, 12.

employed in sewing machines, while the British system, introduced in America at Philadelphia, was better suited for making locomotives and heavy machinery.

The United States early took the lead of all nations in the division of metal-working served by automatic mechanism. The use of such machinery naturally first suggested itself in operations requiring the repetition of a uniform series of simple movements. Such operations were especially irksome to American workers, who were accustomed to varied pursuits and temperamentally impatient of routine. Moreover, the scarcity and high pay of skilled labor in the United States forced attention to devices replacing handwork. But all these influences failed to stimulate invention, except where the demand for machine-made products was large enough to justify installing equipment to manufacture them. When the Constitution was adopted, metals were applied to comparatively few uses. Aside from castings, the market for uniform shapes was limited to certain agricultural implements, such as scythes and shovels, to axes and common tools, and to nails and card-teeth. Though rolling mills and trip-hammers made the larger of these articles, nails were forged and card-teeth were bent by hand, as they had been for the thousands of years since they first were used for constructing houses and preparing wool. Shortly before 1790, however, Americans invented machinery that automatically cut plates into nails, bent wire into card-teeth, and even set the latter into their leather backing.[83] This was a pioneer step in the mechanical production of uniform metal objects, which opened the way to interchangeable mechanism and associated phases of manufacturing development.

As machinery performs an organized operation, its invention usually depends on a preceding organization of labor conforming to the logical subdivisions of a complete manufacturing process. Great inventions originated in England, because in that country manufactures were highly developed, the successive stages of each industry differentiated, and labor specialized, so that, as a matter of practical shop routine, processes had been analyzed into elementary operations readily executed by machinery. At first this condition did not prevail in the United States. The earliest opportunity Americans had systematically to apply the division of labor to metal manufactures, and to order shop operations in logical sequence, was in making firearms for the government. Federal contracts for rifles and pistols were large enough to repay the cost of installing a plant and to employ an organized force of trained mechanics. The economy of specialized labor in such

[83] Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1861, 100–101; *American State Papers, Finance*, II, 436; Bagnall, *Textile Industries*, 154–155; Morse *Geography* (ed. 1789), 216; *Massachusetts Magazine*, I, 455, July 1789; *American Museum*, XI, 225; Kittredge, *American Card Clothing Industry*, 15, 44–46. For early development of nail-making machinery, see Bentley, *Diary*, II, 219, Apr. 17, 1797; II, 330, May 23, 1800; II, 394, Sept. 15, 1801; III, 498, Feb. 14, 1810; IV, 416, Oct. 21, 1816; IV, 536, July 27, 1818.

establishments soon became manifest. In 1808 Simeon North, who was making arms for the Government, wrote to the Secretary of the Navy: "I find that by confining a workman to one particular limb of the pistol until he has made 2,000, I can save at least one quarter of his labor."[84] A year before this an English traveler reported that Eli Whitney, of Connecticut, "has applied machinery to the entire manufacture of firearms, of which he is at present making a large quantity for the United States. For every part of a musket he has a mold; and there is said to be such exactitude in the finishing that every part of any one musket may be adapted to all the parts of any other."[85]

Interchangeable mechanism had been suggested even earlier in Europe, but did not realize its full possibilities until combined with automatic machinery.[86] America's contribution to the technique of metal-working was particularly in the latter field and, by joining these two ideas, what was essentially a new system of manufacturing was developed. Machines for cutting nails and making card-teeth were soon succeeded by others for making tacks, screws, wrought nails, spikes, bolts, rivets, files, and chains.[87] An American machine made solid-headed pins and stuck them in papers without the intervention of any human hand. So greatly did such devices economize labor that, in spite of the fact that they soon were introduced abroad, domestic manufacturers easily met foreign competition, since wages affected production cost inappreciably. Articles thus made were more widely utilized because they could be employed for objects for which previously they were too expensive, and the enlarged market so afforded encouraged the use of ever cheaper methods of manufacturing them.

As soon as a demand was created for interchangeable parts in firearms and machinery, the application of automatic mechanism to metal manufactures at once expanded, for these interchangeable parts were merely a new class of uniform shapes, such as the nails, screws, and pins that entered directly into general consumption. Before the middle of the century American armories were said to employ 100 different machines to make the standardized parts of rifles.[88] These machines were self-acting and several of them could be attended simultaneously by a single workman.

One of the more striking applications of this system was to making clocks and watches. Division of labor and power machinery had

[84] North, *Simeon North*, 64; *cf. id.*, 81, 85, 106.

[85] Kendall, *Travels*, I, 252.

[86] *Cf.* Thomas Jefferson's letter to John Jay, Aug. 30, 1785, in *Writings*, V, 105–106.

[87] *E.g.*, tacks, McLane, *Report on Manufactures*, II, 273; screws, *American State Papers, Finance*, VI, 436; *Bagnall Papers*, II, 1609; *Niles' Register*, XII, 96, Apr. 5, 1817; wrought nails, *Niles' Register*, XXXII, 372, Aug. 4, 1827; XXXVI, 304, July 4, 1829; XXXVII, 398, Feb. 6, 1830; *Banner of the Constitution*, I, 143, Feb. 17, 1830; spikes, *Niles' Register*, XXXVI, 55, Mar. 21, 1829; bolts, Swank, *Iron in All Ages*, 208; files, *Niles' Register*, I, 390, Jan. 25, 1812; *Hunt's Merchants' Magazine*, XVIII, 228, Feb. 1848, *Farmer and Mechanic*, II, 32, Jan. 20, 1848; chains, *Boston Commercial Bulletin*, Dec. 29, 1860; Whitworth, *Special Report on New York Industrial Exhibition of 1853*, 9–10.

[88] *Farmer and Mechanic*, II, 440, Sept. 14, 1848; *cf.* Committee on the Machinery of the United States, *Report*, 78–83, in Great Britain, *Parliamentary Papers*, 1854–1855, L.

already reduced the cost of wooden clocks, when, about 1840, the substitution of metal works revolutionized the industry. These works were of brass, which was manipulated more easily than iron and steel. Small wheels and gears were made as easily as nails and screws. The only problem that their mechanical production involved was that of accuracy, and this soon was obtained. American clocks, as we have seen, were invoiced to Europe for prices so low as to be incredible to foreigners. It was but a step from the manufacture of clocks to that of watches. Until 1850 England and Switzerland supplied these to our markets. It was supposed that such delicate mechanism could be made with success only where labor was cheap and skill was handed down from generation to generation through long apprenticeships. In 1850, however, Americans undertook to make watches by machinery at Waltham, the home of our first power-looms. In spite of temporary failures, automatic machines were ultimately devised of such precision that not only were watches manufactured with high-priced labor more cheaply than they could be made abroad, but they were superior to any but the costliest imported timepieces.[89]

WOOD-WORKING MACHINERY

Many mechanical ideas applied to working metal were suggested by earlier devices for working wood. As early as 1792 Massachusetts cardmakers had "complete machines for cutting boards which formed both concave and convex parts, to great perfection, at a very few strokes. A lathe is also invented, for turning handles either oval, flat, or round with great ease and facility." With this machinery 8 men could make 50 dozen sets of cards a day.[90] In the United States armories at Springfield and Harpers Ferry a machine was perfected that automatically turned gun stocks from a pattern.[91] The mechanical production of uniform shapes foreshadowed interchangeable machine and construction parts of wood. Wooden clock-wheels, which probably were interchangeable, were made at Connecticut factories before metal works were introduced.

Circular and belt saws, originating in Europe, were employed in America between 1815 and 1820. The former were soon in general use and were manufactured in this country; but band saws were not a practical success until later.[92] Special mills to make shingles, laths, and clapboards, planers and edgers, and machines for grooving and mortising became a commonplace in woodworking establishments.[93] As

[89] *Scientific American*, XVIII, 341, May 30, 1868; United States International Exhibition of 1876, *General Report, Judges Group*, XXV, 89–90.

[90] *Massachusetts Magazine*, III, 269, May 1791.

[91] Charles H. Fitch, *Report on Interchangeable Mechanism*, 15–17, in U. S. Census 1880, *Manufactures*.

[92] *Niles' Register*, XII, 336, July 19, 1817; XVI, 93, 144, Mar. 27, Apr. 17, 1819; XLV, 67, Sept. 28, 1833; Bishop, *History of American Manufactures*, III, 265, 349.

[93] *Niles' Register*, XXVI, 329, July 10, 1824; XL, 251, June 11, 1831, XII, 224, Nov. 19, 1831; Richards, *Treatise on the Construction and Operation of Wood-working Machines*, 2–19; *DeBow's Review*, XVII, 636–638, Dec. 1854.

early as 1850, 20 men could make 100 paneled doors a day, and some factories were engaged exclusively in manufacturing, by self-acting machinery, doors, windows, staircases, and other joinery.[94] A small display of American woodworking devices at the London Crystal Palace, in 1851, commanded great attention; and three years later the British commissioners to the New York Exposition commented upon the superiority of our machinery in this department.[95] It was already used to some extent in England. The increase in general comfort which we owe to manufacturing wood by power is apt to be forgotten, so universal is the present use of machine-made wooden articles. Factory goods displaced rude, home-carpentered implements and furniture and the carts and wagons of local coachmakers in the same way that Massachusetts domestics and Rhode Island prints supplanted the homespun fabrics of the farmstead.

TEXTILE MACHINERY

Fibers are transformed into fabrics by four stages—preparation, spinning, weaving, and finishing. In America these operations were manual and discontinuous until about 1790; twenty-five years later they were continuous and performed by power. The machines used to manufacture cotton, wool, hemp, flax, and silk are not identical, but the processes they accomplish are sufficiently similar in principle to give uniformity to their technical development.

Preparation consists of cleaning and straightening a staple and uniting it into a ribbon or roll of loose parallel fibers and uniform body for spinning. Wool as it comes from the sheep's back and cotton as it comes from the boll are not ready to card. The most important improvement in the phase of preparation preceding carding was the cotton-gin, invented by Eli Whitney in 1793, which mechanically separated the fiber from its seed and made it possible to produce cotton more abundantly and cheaply than before. Until toward the middle of the century cotton and wool were shipped in loose bales or bags without pressing. Consequently they were received at the factory less compacted than at present, but nevertheless they required opening and cleansing of dust, burs, and other foreign matter. Machines to perform these operations originated in Great Britain late in the eighteenth century, but apparently were not known in this country, where cotton continued for some time to be cleaned by hand and by whipping upon a net. About 1807 New England inventions, called pickers and willows, displaced hand labor in this process.[96] Between 1830 and 1840 another

[94] Whitworth, *Special Report on New York Industrial Exhibition of 1853*, 13. For observations on the use of wood-working machinery in the manufacture of melodeons, pails, railway cars, sash, and doors, see Committee on the Machinery of the United States, *Report*, 13, in Great Britain, *Parliamentary Papers*, 1854–1855, L.

[95] *Cf.* also Committee on the Machinery of the United States, *Report*, 13, 66–67, in Great Britain, *Parliamentary Papers*, 1854–1855, L.

[96] White, *Slater*, 187 (note); Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1861, 77; 1864, 79; Bagnall, *Textile Industries*, 327; Peck and Earl, *Fall River and Its Industries*, 19; North, *New England Wool Manufacture*, in National Association of Wool Manufacturers, *Bulletin*, XXXII, 124, June, 1902.

American device, for crushing and eliminating burs from wool, greatly cheapened first operations upon that staple and lessened waste at this stage of its manufacture.[97]

The earliest preparatory process to be performed by power was carding. Hitherto this operation consisted of passing two parallel cards over each other by hand. The process was made mechanical and in part continuous by substituting cylinders revolving against concave surfaces, or in contact with rollers, for flat card surfaces. Such cylinders might be turned by water, and their size and product were much greater than those of the preceding hand implements. Probably it never will be known with certainty when the first appliance of this character reached our shores, but the continuous history of American carding machinery dates from the introduction, shortly before 1790, of cylinder cotton-cards at Beverly and Pawtucket, and of wool-cards, a year or so later, at Charlestown, Byfield, and Hartford. The latter soon were erected all over the country to card wool for household spinners, but cotton-cards continued to be associated with factories. Many improvements in this machinery were brought from abroad, and others originated in this country.

The most important American invention was the Goulding condenser, used in woolen mills. This was introduced about 1826 and consisted of a series of carding-machines essentially like those previously used, with intermediate mechanism by which the filaments of wool, as they left each machine of the series, were delivered automatically to the next, and at the close of the carding operation transformed into a roving which could be spun directly upon a jenny or mule into yarn. This improvement displaced the intermediate labor of children, who previously had transferred the filaments of carded wool from each machine of the series to its successor; it likewise saved the labor used to prepare from the final filament the roving fed to the spinning-machine. It enabled a spinner to operate 200 spindles instead of 120 and made it possible for carding-cylinders, previously limited in length by the difficulty of transferring long filaments by hand, to be doubled in size and their speed to be raised from 75 revolutions a minute to 100.[98] Another laborious operation was obviated about 1853, when two Americans independently invented means by which cards cleaned themselves automatically of dirt and waste, that previously required to be removed at frequent intervals by hand.[99]

Some fibers, such as flax, hemp, and long-staple wool, are not prepared by carding, but by combing, a process relatively more difficult to perform mechanically. The fact that this operation remained manual

[97] Vermont, *Senate Journal*, October session, 1846, 167; North, *New England Wool Manufacture*, in National Association of Wool Manufacturers, *Bulletin*, XXXII, 141–142, June, 1902.

[98] North, *New England Wool Manufacture*, in National Association of Wool Manufacturers, *Bulletin*, XXXI, 266, 267, Sept. 1901; XXXII, 132–133, 141, June, 1902; Hayes, *American Textile Machinery*, 47–48.

[99] *American Textile Manufacturer*, I, 224, Dec. 1881; Webber, *Manual of Power*, 61.

checked linen and worsted manufactures in America, where the necessity thus imposed of using highly skilled and compensated labor made them unprofitable.[100] Nevertheless, about 1840, the hand-combing of wool, practically in abeyance since the previous century, was resumed in connection with the manufacture of worsted dress-goods in New England. Combing-machines were invented in America about this time, but were not fully successful, and before 1860 were replaced by recently perfected foreign machinery.[101]

Cleaning, carding, and combing thus became entirely mechanical operations. These processes were not so well performed in the United States as in Great Britain, partly because cotton was cheaper in this country and not so carefully husbanded, partly because the mechanical development of England was in advance of our own, and partly because costly and ill-trained, even though intelligent, labor confined our manufactures to coarser fabrics, in making which refinements of preparation were not necessary.[102]

So long as spinners used but a single spindle they could draw and piece the fibers as they spun, but with the advent of machines containing several spindles these processes became a separate operation. Wool or cotton is delivered from the card in a continuous roll, which is doubled, drawn, and slightly twisted by machinery into a continuous pencil of fibers, smaller and more uniform in thickness and body than the roll, which is called a roving. Even after spinning was done by improved machinery, rovings were for a time made on hand-wheels. At an early date, however, special apparatus was devised to accomplish this object, and we have seen that in case of wool the process was made fully automatic by the Goulding condenser.

Jennies were the first multiple spinning-machines used in America. They consisted of a wooden frame containing 20 or more vertical spindles rotated by a hand-wheel. Elsewhere on the frame were an equal number of spools of roving. The rovings passed from the spools to the spindles between two horizontal bars of wood, called a clasp, forming a light carriage running on top of the frame. Starting from a position near the spindles, with the rovings held firmly between the bars of the clasp, the carriage was pulled toward the operator as the spindles rotated, thus drawing out the rovings and twisting them into yarn simultaneously. The carriage was then pushed toward the spindles and the yarn at the same time wound upon them. Before repeating the operation, another reach of rovings was paid out between the clasp and spindles. With this apparatus one person could spin 20 or more strands at a time.

Jennies were invented in England about 1767, and one was exhibited in Philadelphia before the Revolution. Immediately after the war

[100] It remained manual in England until about 1840; Burnley, *Wool and Wool Combing*, 166
[101] United States International Exhibition of 1876, *General Report, Judges' Group* IX, 61–62.
[102] Montgomery, *Cotton Manufacture*, 82.

they were introduced at several places for spinning cotton. At first jennies were operated only by hand. In 1790 the Beverly factory contained a two-cylinder machine, carding 150 pounds of cotton daily, and four jennies with 70 and 84 spindles each.[103] The same year there is printed notice of a mill in South Carolina operating by water ginning and carding machiney, and containing spinning-machines with 84 spindles.[104] At this time hand-jennies were in use in Rhode Island.[105] The same year a multiple spinning-machine, operated by power, containing 4 heads of 8 spindles each, was employed at Haverhill to spin flax for sailcloth.[106] Later cotton-jennies were manufactured extensively in Philadelphia and Cincinnati for the West and South, where they displaced wheels to some extent for household spinning.

Though probably not used to spin wool as early as cotton, the jenny retained its place in the latter manufacture for a longer period. In 1794 the Hartford Woolen Manufactory apparently had no jennies, though one was mentioned in its sale of machinery the following year.[107] In cotton factories they immediately were displaced by Arkwright machinery, except as they were used occasionally to spin cotton and woolen filling. They survived in the woolen industry because the Arkwright system of spinning was not adapted to that staple.

After the War of 1812 jennies began to be run by power. Later the original jenny was succeeded by a modification called the jack, in which the spindles were fixed directly to the moving carriage and the roving was held fast during the drawing by rollers. The latter continued in use until after the Civil War. About 1824 another modification was introduced, named, from its American inventor, the brewster. In this machine the spindles were placed horizontally near the floor and the carriage, carrying creels of rolls, moved vertically above them. As the carriage rose the rolls were drawn and spun into yarn; as it fell the yarn was wound on the spindles. This apparatus never entirely superseded the jenny, but was used for a time to spin woolen warp.[108]

The early displacement of jennies in cotton manufacturing was due to the fact that they did not spin from this fiber a thread firm enough for warp, and until this was accomplished cotton could only partially supersede flax in lighter fabrics. Until 1790 the only yarn spun by power anywhere in the world was made on Arkwright machines in

[103] Washington, *Diary*, 40–41, Oct. 30, 1789; Bentley, *Diary*, I, 200–201, Sept. 24, 1790. This machinery had been increased to 9 jennies and about 600 spindles the following year; letter of George Cabot, Sept. 6, 1791, in *Hamilton Papers*, Library of Congress.

[104] See 534, 537, *f.*; *American Museum*, VIII, Appendix IV, 11; Coxe *State of the Union*, 9.

[105] Letter of Moses Brown, July 22, 1791, in *Hamilton Papers*, Library of Congress; Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1861, 101–102; Batchelder, *Cotton Manufacture*, 38; Bagnall, *Textile Industries*, 148–152.

[106] *Columbian Centinel*, May 21, 1791; *cf.* Washington, *Diary*, 46, Nov. 4, 1789; Bentley, *Diary*, I, 149–150, Feb. 26, 1790.

[107] Wansey, *Excursion to the United States*, 260; North, *New England Wool Manufacture*, in National Association of Wool Manufacturers, *Bulletin*, XXIX, 145, June, 1899.

[108] Montgomery, *Cotton Manufacture*, 81; *Niles' Register*, XXVI, 363, July 31, 1824; *Mechanics' Magazine*, I, 190, Nov. 15, 1823; *American State Papers, Finance*, V, 810, 811, 815, 821.

Great Britain. The latter machines had been developed by their inventor, between 1769 and 1775, by combining the isolated and imperfect discoveries of earlier patentees into a practical and nearly automatic system for preparing and spinning cotton. They differed in principle from the jenny in that drawing and twisting were successive instead of simultaneous operations. Rovings were drawn out by a series of rollers turning at different speeds, and subsequently twisted by a flier on rapidly moving spindles. The yarn so made was harder and stronger than that spun on jennies, and suitable for warp, a fact that accounted in part for the introduction of this system, in 1790, at Pawtucket.[109]

Until the War of 1812 these machines, called water-frames because they alone were operated by power, contained 68 to 84 spindles and were made of wood, with brass gearing.[110] American improvements in this method of spinning were so numerous and important as to direct its further development. Passing over several of these, not easily described to the general reader, two New England inventions largely account for the successful competition of throstle-spinning in America with mule-spinning. In the original water-frame the roving was twisted and wound upon the bobbin by a flier attached to the spindle upon which the bobbin was set. The product of such a machine was limited by the fact that the spindle, being free at the top, vibrated excessively if rotated at high speed. The size of the yarn was limited to numbers under 60, because finer numbers were broken in the process of winding. Both these difficulties were obviated by an invention of Charles Danforth, of Massachusetts, in 1828, which consisted of a device by which the bobbin, instead of the spindle, rotated. The yarn was twisted by passing around a ring poised over the bobbin from a loose cap supported by the top of the spindle. Instead of the thread dragging the bobbin, as in the Arkwright throstle, the bobbin dragged the thread. This made the tension uniform, no matter how much yarn was on the bobbin, thus giving the yarn greater evenness, required less power to operate, and enabled the bobbin to be rotated so rapidly as to increase the product 40 per cent.[111]

In 1828 also another American inventor—John Thorp, of Providence—patented the ring traveler. This device made it possible to spin still finer yarn at still higher speed. At first ring-spinners were made so inaccurately as to be inoperative, but they were improved and perfected by William Mason, of Taunton, and ultimately displaced all other methods of throstle-spinning.[112] Even with the various im-

[109] Letter of Moses Brown, July 22, 1791, in *Hamilton Papers*, Library of Congress; White, *Slater*, 84–85.

[110] Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1861, 98; Batchelder, *Cotton Manufacture*, 56; *cf.* Winterbotham, *View of the United States*, II, 234–235.

[111] White, *Slater*, 330 (note). For earlier spindle improvements, see Appleton, *Introduction of the Power Loom*, 10; Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1861, 85; *id.*, 1864, 83. Hayes, *American Textile Machinery*, 37–40.

[112] *American Textile Manufacturer*, I, 124, July 1880; *cf. Niles' Register*, XXXVI, 116, Apr. 18, 1829; *Bagnall Papers*, III, 1821, 1822. Clark, *John Thorp*, 8–9.

provements made at Waltham and elsewhere, Arkwright spindles revolved less than 4,000 times a minute; with the Danforth cap speed might be increased to 7,000 or 8,000 revolutions, and with the ring-spinner to 12,000 revolutions.[113] These improvements made it possible to spin on throstles yarn so soft and elastic as to be suitable for the weft of fine fabrics, and gave a preference to this system in America that it did not have in Great Britain, although the devices just mentioned were introduced and improved in detail abroad.[114]

While the American Revolution was in progress a machine was developed in England combining certain features of the Arkwright spinning-frame with those of the jenny, which, from its hybrid origin, later was named the mule. This machine drew the rovings, as did Arkwright's, by a series of rollers, but combined this process with twisting under tension on spindles that retreated from the drawing-head during that part of the operation. By this machine a finer and softer yarn can be produced than on any Arkwright frame, because during the tension of the roving the twist goes first to the thin places, where least resistance is offered, leaving the thick places but partly twisted. The pull of the carriage then draws out these slack-twisted portions until they are attenuated sufficiently to receive an equal twist with their neighbors. This results in a very even yarn and enables the finest numbers to be spun mechanically.

A mule used at New York in 1794 was probably the first in the United States.[115] Ten years later Moses Brown mentions a mule of 144 spindles that went by water at his factory, and about the same time another was in operation in Pennsylvania.[116] Between 1804 and 1812 a number of mules for cotton were introduced in Rhode Island, where they began to displace throstle-spinning to some extent.[117] A machine of this sort was operated by the Boston Manufacturing Company in 1817, but no mules were installed at Lowell until 1845.[118] They were used solely for weft until 1830, when warps were made upon them at the steam mills in Providence.[119] Many of those employed in America were operated by hand, as they were in England, until the self-acting mule was perfected in the latter country. For a long time a prejudice existed in America in favor of throstle-yarns, which were used for both warp and filling, because they made a stronger, even if less finished, cloth. Likewise they stood better the rough usage of early power-

[113] *Westminster Review*, XVIII, 403, Apr. 1833; *Niles' Register*, II, 22, Sept. 10, 1836, quoting *Lowell Journal*.

[114] *Banner of the Constitution*, II, 143, Apr. 1831, 1841; *cf.* Montgomery, *Cotton Manufacture*, 60–61, 71.

[115] Bagnall, *Textile Industries*, 185–186; Wansey, *Excursion to the United States*, 69.

[116] Letter to Gilbert Everingham, Feb. 2, 1804, in Almy and Brown, *Manuscript Letter Book;* Morse, *Universal Geography* (ed. Boston, 1805), I, 544, *re* Canonsburg.

[117] Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1861, 76, 87; *id.*, 1864, p. 79.

[118] Boston Manufacturing Co., *Manuscript Account Books*, Payrolls, May 1817; Mills, *Lowell*, 80.

[119] *Bagnall Papers*, II, 1626.

looms. Consequently throstle-spindles were employed relatively more in America than in England. In 1835 the latter country had 12 mule spindles for every throstle; in the United States they were in equal proportions.[120] This difference is partly accounted for by the fact that mules were operated by skilled adult labor, while throstles were attended by unskilled women and children; and partly by the fact that British factories spun finer numbers than our own. Moreover, with throstle-spindles it was difficult to produce yarn of the quality and style required in England, where spinning and weaving were done by different manufacturers and weavers bought graded yarns in the open market.[121]

England led the United States in mule improvements, and the first successful self-acting machines were made abroad. They were imported into this country before 1840, at which date those made at Providence were said by a British authority to be equal to the best in Glasgow.[122] Though originally used for cotton, they later began to displace jacks in woolen mills, and entirely supplanted the brewster, but they did not become dominant in this industry until after the Civil War.[123]

The invention of the fly-shuttle, in 1738, greatly increased the capacity of hand-looms, and thereby the demand for yarn. The yarn shortage created a new interest in spinning machinery, and partly accounts for the inventions of Arkwright, Hargreaves, and Crompton; but these in turn produced more yarn than hand-looms could utilize, and thus, by reversing the condition of a few years earlier, stimulated weaving improvements to employ this surplus. Automatic looms had been attempted, and perhaps in part perfected, on the Continent of Europe before the great spinning improvements just mentioned. But the continuous history of power weaving dates from Cartwright's loom, invented in England in 1785. For many years, however, this invention was not sufficiently perfect to displace hand-looms, and it was still in process of modification to adapt it to factory requirements, when Francis Lowell, in 1814, invented a loom which was used successfully at Waltham.[124] Three years after these American looms went into operation, a power-loom was introduced into Rhode Island

[120] *House Doc.* 146, 24th Cong., 1st sess., 49; Baines, *History of Cotton Manufacture*, 209 (note). In 1832, the proportion in New York State was over 5 mule spindles to 9 throstle spindles, McLane, *Report on Manufactures*, II, 48–58.

[121] *American Wool and Cotton Reporter*, XIII, 1306.

[122] Montgomery, *Cotton Manufacture*, 75; *cf.* Great Britain, *Parliamentary Papers*, 1833, VI, 169, questions 2651–2654.

[123] North "New England Wool Manufacture," in National Association of Wool Manufacturers, *Bulletin*, XXXI, 275, Sept. 1901.

[124] For earlier loom improvements in the United States, see *American Wool and Cotton Reporter*, XIV, 852; Bagnall, *Textile Industries*, 222–225; Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1864, 62; Batchelder, *Cotton Manufacturer*, 63–64. For Waltham loom, Appleton, *Introduction of the Power Loom*, 9; Batchelder, *Cotton Manufacture*, 64–68.

from Scotland, somewhat simpler and cheaper than the Waltham design.[125] Thereafter the growth of power-weaving in America was very rapid—relatively greater than in Great Britain, where industrial conservatism, manufacturing organization, and the large production of fine fabrics, for which at first power machinery was not adapted, tended to maintain hand-weaving.

The Waltham and Scotch looms wove only cotton. Each possessed advantages over the other, which later were combined in a single model. The four problems then presented to inventors were to improve the quality of power-woven cloth, to increase output, to adapt these looms to weaving wool, and to make them capable of producing fancy fabrics.

A power-loom for broadcloth is said to have been erected in Connecticut in 1820.[126] Such looms were in operation at Delham two or three years later, and acquired an established place in American mills between 1825 and 1828.[127] At this time, however, cassimeres were still woven by hand.[128] Meanwhile, power-weaving in both England and America was confined to plain fabrics. In 1824 Samuel Batchelder, who had already perfected a device for weaving seamless bags and pillow-cases on hand-looms, put into operation at New Ipswich, and later, at Lowell, a loom that wove twills, checks, and other pattern fabrics.[129] About this time William Mason, who later perfected the ring-spinner, invented and set up at Canterbury, Connecticut, power-looms for making damask and figured linens.[130] Seven years later William Crompton, an English weaver who had settled in Massachusetts, invented the first successful power-loom for making fancy cotton fabrics. At the invitation of the proprietors of the Middlesex Mills, at Lowell, he adapted this loom to fancy cassimeres, and thus introduced a new era in the manufacture of the latter, and indeed in the entire woolen industry. A careful test at the Middlesex Mills demonstrated that American power-loom woolens could not be distinguished from the best hand-loom products of Europe.[131]

In 1837, the same year that Crompton patented his loom for fancy cottons, Erastus Bigelow, of Massachusetts, patented a loom for making coach lace. Shortly afterwards he undertook the far more difficult task of inventing machinery that would weave ingrain carpets by power, something hitherto not accomplished in any country. In 1841 he had so far succeeded in this object that the product of his looms excelled carpets made by hand. During the next few years he further

[125] Batchelder, *Cotton Manufacture*, 70–71; Bagnall, *Textile Industries*, 546–549; Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1864, 62–74.

[126] See 565, *f.; cf.* Cole, *History of Tolland County*, 370.

[127] American State Papers, Finance, v, 824.

[128] *American State Papers, Finance*, v, 811.

[129] *Bagnall Papers*, III, 2221, 2275.

[130] *Bagnall Papers*, III, 1819–1821; *cf. Niles' Register*, XXXVII, 67, Sept. 26, 1829.

[131] *Bagnall Papers*, IV, 2524, 2525, 2526; letter of Samuel Lawrence, in National Association of Wool Manufacturers, *Bulletin*, XXI, 189, June, 1891.

improved this loom, adapting it also to the manufacture of Brussels and Wilton carpets.[132]

About the time these revolutionary improvements were made in American looms for weaving cotton and woolen, other New England inventors adapted them to weaving silks.[133] Practically no limitation now remained to the character and quality of goods that could be woven by power. Future loom improvements were directed mainly to simplifying and perfecting details of construction so as to increase output and to lessen the labor of attendance. Even in 1840, before the more important American improvements were generally adopted, an English expert, familiar with the best foreign and American mills, observed that, though America as yet did not equal Great Britain in carding and spinning, its weaving machinery was possibly superior to that used abroad.[134] This was ascribed partly to the fact that power carding and spinning were already well established in England before they were introduced here, but that power weaving developed almost contemporaneously in both countries. Relatively to the total amount of cloth produced, the proportion woven by power was greater in America than elsewhere. Nevertheless, as late as 1840, hand-weavers formed an important fraction of the industrial population of New York and Philadelphia; they mostly made specialties and small lots, and thus were protected to some extent from wholesale factory competition. Hand-weaving, except of carpets and occasional household fabrics, disappeared in New England between 1830 and 1840. It continued in Philadelphia, though with declining prosperity, until the Civil War.[135]

Though England had knitting-machines before she had colonies in America, the first successfully run by power were put in operation, in 1832, at Cohoes, New York.[136] Subsequent inventions so cheapened production as to give knit fabrics a new position in the textile trade; and knit underwear, formerly a novel article of apparel, gradually became popular. In 1846 a New York inventor devised the first successful mechanical process for making hats, and about the same time two other Americans invented machines to manufacture felt.[137]

The growth of textile manufactures depended upon an increasing

[132] *American Wool and Cotton Reporter*, XVI, 783; *Bagnall Papers*, IV, 2565, 2570, 2575, 2580; *Hunt's Merchants' Magazine*, XXX, 171–175, Feb. 1854; Hayes, *American Textile Machinery*, 52; Bigelow, *Correspondence Relating to the Invention of the Jacquard Brussels Carpet Loom*.

[133] *Cf.* Montgomery, *Cotton Manufacture*, 102–103; *Hunt's Merchants' Magazine*, XXX, 175, Feb. 1854; Wallis, *Special Report on New York Industrial Exhibition of 1853*, 20–21.

[134] Montgomery, *Cotton Mañufacture*, 82, 104; Great Britain, *Parliamentary Papers*, 1833, VI, 169, question 2642; *cf.*, questions 2698–2702, 5436, 5445, 5446, 11381.

[135] See, however, 559, 574, *f.*

[136] *Memoirs of the Wool Industry*, 9; *Bagnall Papers*, II, 1286–1293.

[137] *Niles' Register*, XLIX, 102, Oct. 17, 1835; LX, 32, Mar. 13, 1841; *Bagnall Papers*, I, 356–357, 370; *Scientific American*, XIV, 427, June 23, 1866; United States International Exhibition, 1876, *General Report, Judges' Group*, IX, 47; Committee on the Machinery of the United States, *Report*, 62, in Great Britain, *Parliamentary Papers*, 1854–1855, L.

use of factory goods, and this, in turn, upon a change in the character of fabrics. So long as cloth was made laboriously by hand, most consumers wore from season to season durable homespun of the same style and pattern. As soon as it was possible to produce goods mechanically with little labor, people became more fastidious, clothing was not worn so long, its texture was diversified, and considerations of fashion appealed to a wider range of consumers. Patterns, color, design, and other superficial qualities, therefore, acquired new importance and shaped the subsequent development of processes and machinery. France originated the dyes, weaves, and other combinations of pattern and material that express themselves in style. The Jacquard loom, invented in that country in the eighteenth century, was a mechanical response to her peculiar position in the world's textile industry. In 1824 this loom was introduced in America for weaving fancy silks.[138] It was not yet operated by power, but it contained principles and suggestions embodied in the automatic looms later invented in America for weaving fancy fabrics of cotton and wool.

Early in the century chemical bleaching brought from abroad entirely supplanted the older method of lawn bleaching, and made what formerly was a process of months an operation of a few hours. Block-printing was too laborious to intrench seriously upon the custom of weaving colored cottons from dyed yarns. Late in the eighteenth century cylinder printing-machines were invented in England, and they were introduced in America about 1810.[139] It took over thirty years for them to displace block-printing, and the latter was temporarily but unsuccessfully revived during the Civil War.[140] This was partly because colors transferred by the older process were faster than those printed from cylinders. But the new method became well established in America between 1825 and 1830. During these years the best foreign machinery was imported surreptitiously from England and skilled workers were brought over to introduce the latest improvements of their art. Cylinder machines so cheapened printing that their product displaced many yarn-dyed fabrics, though looms were invented for weaving automatically checks, stripes, and ginghams. British manufacturers were deceived in their expectation that for printing purposes cloth made from our throstle yarns could not compete with English mule-spun fabrics. An American invented the process of transferring patterns to cylinders from engraved steel dies, and in this country was erected one of the first machines for printing in twelve colors.[141] Had it not been for the development of this art in America, our markets

[138] United States International Exhibition of 1876, *General Report, Judges' Group*, IX, 107.
[139] Bishop, *History of American Manufactures*, II, 164.
[140] Peck and Earl, *Fall River and Its Industries*, 31; *American Wool and Cotton Reporter*, XVII, 140.
[141] *Hunt's Merchants' Magazine*, XXVI, 645, May 1852; *DeBow's Review*, XVI, 2, Jan. 16, 1854; Hayes, *American Textile Machinery*, 45.

would have been overstocked with the plain fabrics made so abundantly by the big New England mills. Calico-printing diverted this excess into new channels, where it displaced foreign goods and supplanted home-dyed cloths.[142]

In the case of woolens, the finishing processes employed by colonial fulling mills continued to be used in America, but they were facilitated by local inventions for napping, shearing, brushing, and pressing cloth.[143] As early as 1812 steam was used for these operations in Connecticut, and a few years later in Ohio.[144] American chemists made improvements in the art of dyeing,[145] but in general we remained dependent on foreign discoveries in this department. Wool continued to be dyed in the fiber, the yarn, or the fabric, but the introduction of the Crompton loom caused colored yarns to be used relatively more than in the early plain goods. Soon after 1840 the printing of worsted and mixed cotton and woolen goods was introduced, a process in which such perfection was obtained later that it was difficult even for an expert to detect the difference between the printed woolens of America and the yarn-dyed woolens of Europe.[146]

In 1800 what now have become commonplaces of industry were still so novel that the literature of the time abounded with calculations to show the increased productiveness of labor through machinery. A hand-wheel spinner spun about 4 skeins of yarn a day. In 1815 a mill spinner could attend 90 spindles, producing daily 180 skeins. Ten years later each operative served more spindles and each spindle produced 5 skeins of yarn. Within another decade spinners operated nearly 200 spindles and each of these produced a still larger product.[147] Machinery not only used unskilled labor for what previously were skilled operations, but it enforced continuous attention in what before were interrupted employments. Merely assembling hand-looms in one establishment increased their product. In 1809, before power-looms were introduced, Moses Brown wrote:

> "We have 100 people now at weaving, but 100 looms in families will not weave so much cloth as 30, at least, constantly employed under the immediate inspection of a workman."[148]

Shortly after their introduction a single operative attended 2 power-looms, and this number later was increased to 4. The product of weavers in typical New England mills rose from less than 100 yards

[142] *American Wool and Cotton Reporter*, XVII, 44.

[143] North, *New England Wool Manufacture*, in National Association of Wool Manufacturers, *Bulletin*, XXXII, June, 1902, 140–141; Bentley, *Diary*, IV, 536, July 27, 1818; Ure, *Philosophy of Manufactures*, 141.

[144] *Niles' Register*, I, 407, Feb. 1, 1812; *American State Papers, Finance*, V, 823.

[145] *E.g.*, Peck and Earl, *Fall River and Its Industries*, 31.

[146] *Memoirs of the Wool Industry*, 23.

[147] *Cf. House Doc.* 146, 24th Cong., 1st sess., 52; DeBow, *Industrial Resources*, I, 221; McLane, *Report on Manufactures*, II, 135; *Bagnall Papers*, III, 1915.

[148] Letter, May 1, 1809, in Almy and Brown, *Manuscript Letter Book*.

a day in 1821, to 233 yards twelve years later; yet this last date was on the eve of further important mechanical improvements.[149] During the fifteen years following the second peace with England the labor cost of making cotton sheeting fell from 18 cents to 4.5 cents a yard; in 1860 it was 2 cents.[150] The technical progress of woolen manufacturing did not keep pace with that of cotton, but the cost of making broadcloth declined 50 per cent between 1822 and 1830.[151] American hat machinery increased the product of each operative eightfold and caused the speedy disappearance of the village hat-maker,[152] while improvements in knitting-machines raised the product of a workman from a dozen pairs to 200 dozen pairs of hose a week. At the opening of the century the owner of a factory thought that he had done well if from the day he purchased his cotton or wool to the time he sold his goods no more than a year elapsed.[153] Within a few years machinery had so accelerated manufacturing that in its ordinary course goods often reached buyers a few days after the raw material from which they were made was received at the factory.

When the first Arkwright machinery was built in Rhode Island, only Sea Island or other long staple cotton could be spun mechanically. Gradually mixtures of long and short staple were introduced, until finally not only ordinary cotton, but even waste, could be made into yarn.[154] About 1830, at the suggestion of a southern correspondent, the Hazards, of Peacedale, carded wool and cotton into a single sliver, which they spun into mixed warp to take the place of all-wool yarns in negro cloth.[155] So expert became manufacturers in incorporating alien materials in their fabrics, that presentable Georgia plains, originally substantial fabric mostly of wool, selling for 35 cents a yard, were ultimately manufactured entirely of hemp and cotton waste and sold for two-fifths their former price.[156] It became possible to work up shoddy with woolen machinery. Shortly before the Civil War a process was discovered for shredding flax mechanically into a short fiber which could be spun with cotton to make a pseudo linen.[157]

While mechanical improvements enabled manufacturers thus to utilize and sometimes to disguise inferior fibers, they had the further effect of enabling them to make, from cheaper staples, products of intrinsic merit. With the invention of the Crompton loom it was

[149] *Niles' Register*, XX, 308, July 14, 1821; XLIV, 424, Aug. 24, 1833.

[150] McLane, *Report on Manufactures*, I, 70; Boston Manufacturing Co., *Manuscript Accounts, Annual Statements of Operations.*

[151] McLane, *Report on Manufactures*, II, 61.

[152] Described by Commission on the Machinery of the United States of America, *Report*, 62, in Great Britain, *Parliamentary Papers*, 1854–1855, L.

[153] Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1861, 88.

[154] *Cf.* Moses Brown, letter, July 22, 1791, in *Hamilton Papers*, Library of Congress; McLane, *Report on Manufactures*, I, 173; Montgomery, *Cotton Manufacture of the United States*, 49.

[155] Letter to R. W. King, Sept. 30, 1831, in R. Hazard, *Manuscript Letter Book.*

[156] William Gregg in *DeBow's Review*, XXIV, 625–630, Oct. 1860.

[157] *Hunt's Merchants' Magazine*, XLII, 523, Apr. 1860; XLIII, 258, Aug. 1860; XLV, 102, July 1861; Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1860, Appendix, 85, 86, 90, 91, 92.

possible to make woolen goods from coarse wool with weaves and patterns so attractive as largely to displace the broadcloths which formerly were the staple product of American woolen looms. About this time cotton began to be used for worsted warps, and dyers acquired the skill to color uniformly mixed cotton and woolen yarns. Broadcloths had been manufactured from the finest wool, and their quality was determined by the material of which they were made. Fancy cassimeres and worsteds depended for their attractiveness upon processes of manufacture, and introduced into the most exclusive circles of consumption democratic materials formerly worn only by the laborer and mechanic.[158]

When spinning-wheels were first introduced in Europe in the Middle Ages, guild regulations forbade this yarn to be used in goods of better grade, because it was thought inferior to that spun with hand-spindles.[159] Early jenny and Arkwright yarns encountered a similar prejudice in America, but so rapidly did they improve that, in 1804, Almy and Brown wrote to a correspondent: "The filling we believe thou will find to be superior perhaps to any thou ever saw."[160] So long as cloth was woven on hand-looms its quality varied with the skill, experience, and care of the weaver, as well as with the character of his yarn. With the introduction of power-weaving it was possible to make standard fabrics of uniform quality which acquired special market reputations. Machines and factory organization thus took over the function of the earlier guild and cloth inspectors.[161]

Machinery produced its most revolutionary effects upon the economy of American manufactures in the first third of the century; but during the years that followed progress was absolutely if not relatively as rapid as during this earlier period. Between 1830 and 1840 occurred the transition in the woolen industry inaugurated by the Goulding condenser. The following decade was marked by the introduction of self-acting mules, and during the ten years ending with the Civil War the capacity of looms was greatly increased, and our factories acquired successful machinery for combing wool. So numerous were mechanical improvements between 1850 and 1860 that the Lowell mills are said to have been practically reconstructed.[162]

In early days the experimental cost of such improvements fell upon factory-owners, but about the time Lowell was founded the manufacture of textile machinery began to differentiate from the manufacture of textiles themselves. This occurred even earlier perhaps at Paterson and Philadelphia, but our greatest inventions were made at Taunton, Providence, Worcester, Lowell, and other machine-making

[158] *Cf.* Wright, *Wool Growing and the Tariff*, 108–110.
[159] Frank, *Textilgewerbe der Stadt Freiburg im Breisgau*, 34, 45.
[160] Letter to John Winteringham, Mar. 30, 1804, in Almy and Brown, *Manuscript Letter Book*.
[161] The charter of the Beverley Cotton Manufacturing Co. granted trade-mark privileges, Massachusetts, *Special Laws*, 1805, I, 224; *Acts and Laws*, 1788–1789, Chap. 119, p. 362.
[162] *Bagnall Papers*, III, 2209.

towns in New England. Engineering became a profession, invention a science, and the risk and cost of experiments were thrown upon an industry organized especially to conduct them.

CONCLUSION

The technical development of iron and textile manufactures is representative of mechanical progress in all branches of industry. A detailed account of other phases of this progress would illustrate few new principles, except perhaps to bring more forcibly to mind the coordination of technical evolution in every field of production. When Goodyear and his fellow-workers discovered how to treat rubber so as to make it a valuable industrial product, their inventions called for new machinery to manipulate that product and to manufacture the special fabrics used in connection with it. As soon as preserving food by hermetically sealing it in containers became a commercial industry, machines were devised upon principles already applied to other branches of manufacture to cheapen and simplify this process. Competition and imitation united to maintain an even rate of progress in all industries, and each forward step in mechanism, though originally suggested by a special need, was found with wider application to advance the whole range of manufactures.

American manufacturing technique was both assisted and hampered by conditions peculiar to a new country. In 1841 a British Parliamentary committee took evidence on a bill to repeal the laws prohibiting the exportation of machinery. The witnesses before this committee were practical manufacturers. One of them stated:

> "I apprehend that the chief part, or a majority, at all events, of the really new inventions, that is, of new ideas altogether, in the carrying out of a certain process by new machinery, or in a new mode, have originated abroad, especially in America."

This witness mentioned a dozen new devices, or radical improvements in old machinery, that had been brought to England, in 1810, from the United States. The inventors or patentees in some instances had settled in England or built works in that country. He continued:

> "I should say that most of the American inventions have had their origin in this way: in America we know that labour has hitherto been dear . . . parties, not having access to the machine-makers of this country for the supply of their wants, have set themselves about to make a machine in the readiest mode to accomplish that which they required; they have been untrammelled by predilections in favor of a machine already in existence, but having an idea of a mode in which to carry out a process they have at once set their minds and ingenuity to work, and in so doing the most roundabout mode has suggested itself to accomplish the object."

Such inventions were usually improved in Great Britain, because they were—

"Placed in the hands of mechanics by different manufacturers in whose separate branch they may have to be applied, and those parties, from the more extensive knowledge they have of the working of the various machines, are better able to perfect them, the workman generally paying great attention to the different working parts. The plan generally adopted in this country is to subdivide labor as much as possible; that subdivision of labor gives great facilities to the workmen to improve the particular branch to which they are attending, inasmuch as their thoughts are not abstracted and taken away by a diversity of subjects, but they can confine themselves more particularly to the machine or the work on which they are engaged, and therefore perfect it."[163]

At this time witnesses personally familiar with manufacturing conditions in both countries thought that, with the possible exception of looms, the textile machinery of England was better than that of America. This was also true of metal-working machines, but in the latter Americans recently had made great progress. The high-pressure engines of the United States were superior for some uses, and certainly better adapted to American requirements than the low-pressure engines largely used in England.[164] The substance of the testimony was that America was the land of originality, Great Britain the land of experience, and that unconsciously and undesignedly the two countries coöperated with and supplemented each other in advancing the world's technical progress.

In comparing America and Europe consideration must be given to the different purposes which machinery was designed to serve. In the United States labor conditions, climate, and markets all checked the progress of finer manufactures, and when these were attempted it was more or less experimentally. In matters of design America yielded first place to its European teachers and, whether for printing and dyeing fabrics or for cutting glass, patterns came almost entirely from abroad. But in producing durable goods for ordinary uses, such as suited the needs of a people absorbed in developing a new continent, the equipment of American mills and factories was not excelled. The economic effects of technical progress had been to cheapen production, diversify products, and increase consumption. Probably in the United States more people relatively to the whole population than in any other part of the world lived in frame houses, with cabinet furniture, stoves, carpets, china, glassware, clocks, and watches; rode in carriages; and performed their ordinary labors with the facilities of improved machinery. This was because these things were made here on a large scale and mechanically. During the half century apparel had become more complex and consulted a higher degree of personal refinement because of improvements in the spinning-frame, the loom, and the knitting-machine. Fashion held fuller sway and its dictates were obeyed by a larger section of the people, because clothing had changed from an

[163] Great Britain, *Parliamentary Papers*, 1841, VII, 111–113, questions 1544–1556.
[164] Great Britain, *Parliamentary Papers*, 1841, VII, 199–208, questions 2295–3002.

ancestral possession to the passing fancy of a single season. Man's increasing command of force and matter led him almost to play with these and to transform them for capricious as well as necessary uses. Not only was individual consumption diversified and extended, but what was even more influential on many lines of technical development, community consumption likewise was varied and augmented. The introduction of gas, of public water-supplies, of drainage, of steam transportation by land and by water, created new orders of needs to be supplied by industries for that purpose. Although the material demands of society and of the individuals that composed it were simpler in 1860 than at present, they had assumed a character so different from the demands of the previous century as to make them part of a distinct and a modern era.

CHAPTER XVII

ORGANIZATION OF MANUFACTURES, 1790–1860

Homespun manufactures, 438. Household and shop manufactures, 440. Mill and furnace industries, 445. The factory system, 448. Control and administration of industry, 455.

HOMESPUN MANUFACTURES

At the close of the colonial period, it will be recalled, homespun manufactures, except in a few plantation districts, were everywhere active; household industries, as evidenced by the sale of their products in general markets, had appeared; and manufacturing artisans had extended their operations from custom work to making goods for general sale. Merchants were beginning to encourage household manufactures financially, and organized capital, which hitherto had confined its support of industry to mills and furnaces, was making tentative essays also at factory undertakings. Our present purpose is to trace the development of industrial organization from these beginnings to its later forms.

Homespun industry has been defined as manufacturing in the family for home use, and household industry as manufacturing in the family for outside markets. Naturally the two frequently overlap and the distinction between them is general rather than particular. Homespun manufacturing, though more primitive—and indeed partly for this reason—persisted relatively longer in the field occupied by factories. Its ramifications extended into many branches of production; but two of these—the preparation of clothing and of food—are representative of all the others.

It is unnecessary here to repeat a description of the processes and the extent of home spinning and weaving before the beginning of the factory period, or to allude again to those conditions of frontier life and market isolation that in some parts of America perpetuated these occupations until the opening of the present century. New methods of production supplanted those of the household neither uniformly throughout the country nor universally in all manufacturing operations, but district by district and process by process. In 1820 it was estimated that two-thirds of the textiles used in America were made in families.[1] The first decade following the introduction of the power loom witnessed a great decline of homespun industry in New England,

[1] Blowe, *View of the United States*, 98; *cf.* 355, 601; Howells, *Life in Ohio*, 123–125; Kayser, *Commercial Directory*, 54–55.

and by 1830 its termination in that region was clearly foreseen.[2] New York, in 1824, manufactured 14,460,000 yards of home-made cloth and continued to encourage home manufacture by premiums at county fairs,[3] but from New Hampshire to Delaware the small flax patches that hitherto had been a feature of almost every farm were disappearing.[4] Further south, especially in the highlands, the factory did not as yet intrude upon the older household economy.[5] So recently as 1876, the centennial year of American independence, the country people of Tennessee still made homespun in considerable quantities. Until 1865, it is said fully nine-tenths of the citizens wore family manufactures, but when peanut cultivation was introduced, soon after the war, many farmers' wives and daughters abandoned cloth-making to assist with this crop. However, repeating the experience of colonial days, a later fall in the price of peanuts caused them to resume the labors of the wheel and loom.[6] Even to-day these domestic arts have not been forgotten entirely by the southern mountaineers.[7]

The survival of homespun industries was prolonged partly by cooperation of the very machinery that was destined ultimately to displace them. The first effect of this machinery was to relieve housewives of only the more laborious and tedious manufacturing operations. Thus wool-spinning in families was revived by the assistance of carding mills, and household weaving extended when local yarn mills came to its support.[8] In 1831 the family loom seemed to have received a new lease of life, and it was not until twenty years later that domestic weaving entered upon a second and final decline. In 1853 a foreign observer reported that manufacturers, especially in Pennsylvania, who formerly did a prosperous business as spinners only, had found the eastern States supplying piece goods so little above the cost of yarn that it no longer was worth the farmer's labor to continue the primitive custom of weaving his own cloth.[9] In the South and West some effort was made to preserve home manufactures by improving the implements with which they were conducted. Between 1830 and 1845 one Cincinnati manufacturer sold in the South 2500 machines, described as occupying less space than a breakfast table, that ginned, carded, and spun six threads of cotton by the operation of a single crank.[10]

[2] McLane, *Report on Manufactures*, I, 70, 78, 87, 172, 585, 977; *cf.*, however, I, 2, 92, 102, etc.

[3] New York, Census of 1824, quoted in McLane, *Report on Manufactures*, II, 69; *cf. American Annual Register*, 1830–1831, VI, 326; Fleishmann, *Erwerbzweige, Fabrikwesen und Handel der Vereinigten Staaten*, 35; Hall, *Letters from the West*, 68.

[4] McLane, *Report on Manufactures*, II, 138.

[5] *Cf.* Olmsted, *Journey in the Back Country*, 140, 141, 220, 231, 234–235; Somers, *Southern States*, 117, 137; King, *The Great South*, 774.

[6] Killegrew, *Tennessee, Its Agricultural and Mineral Wealth*, 757.

[7] *E.g.*, *Manufacturers' Record*, Aug. 12, 1892.

[8] McLane, *Report on Manufactures*, II, 674, question 38, for stimulus to home weaving given by yarn mills.

[9] Wallis, *Special Report on New York Industrial Exhibition of 1853*, 7.

[10] Cist, *Cincinnati Miscellany*, II, 113, Sept. 1845.

Shortly before 1860 another contrivance of similar character, but apparently of larger capacity, was used by Alabama and Mississippi cotton-growers.[11] Plantation manufactures, conducted in separate buildings by slave artisans, approached in extent small commercial industries. Soon after 1830 cotton mill yarn proved cheaper than wheel yarn even when spun by slave girls, but for many years thereafter planters continued to spin wool and to weave negro cloth.

Food preparation, including all processes for the manufacture of provisions, is still in transition from the family to the factory. In motive and character the movement is generally similar to that just described in case of cloth. Commercial milling, bolting, baking, brewing, distilling, and sugar-making go back to very early origins; but while now, except baking, these industries are completely specialized, early in the century they still remained familiar household arts. Meat packing, with its subsidiary manufactures, was beginning to develop into a separate industry at the close of the last century; but before the Civil War the salt tub, the smokehouse, the trying-kettle, the ash-leach, and the candle-mold continued necessary features of every well-conducted farm. Butter and cheese were made at home, and canning and preserving were family occupations. The multitude of foods in jars, tins, and cartons, so familiar to the modern table, either were unknown or contributed insignificantly to the uses of the people. Therefore, during the period we are considering, though this group of industries made some progress toward commercial and factory organization, in the main the family continued to be the manufacturing unit.

HOUSEHOLD AND SHOP MANUFACTURES

Household industries are of two kinds—those in which families use their own materials to make goods for general sale, and those in which they receive materials to work up for employers. Both types existed in the colonies, but the first was the earlier and at the beginning of the Republic was the more common. At this time our most important household manufactures were of flax. We are informed that in 1788 three Philadelphia firms sold "fifty thousand yards of linen made in New England";[12] and three years later the farmers of Connecticut manufactured "large parcels" of tow-cloth, linen, shirting, sheeting, ticking, jeans, and dimities, "for the purpose of barter or sale to merchants, who export them out of the State."[13] The same year in Kentucky "Seven Hundred" linen and linseys were regular articles of commerce, and till after the second war with England these and similar fabrics probably were sold more extensively through the western coun-

[11] *Hunt's Merchants' Magazine*, XXXVIII, 120, Jan. 1858; XL, 626, May 1859; *DeBow's Review*, XXV, 114, July 1858; Olmsted, *Journey in the Back Country*, 76; *Documentary History of American Industrial Society*, I, 191–192, 334.

[12] *Boston Centinel*, Oct. 29, 1788; quoted in Bagnall, *Textile Industries*, 113; *cf.* Crèvecœur, *Lettres d'un Cultivateur Américain*, II, 249.

[13] *Succinct Account of Manufactures in Connecticut*, manuscript inclosure with letter of P. Colt, July 21, 1791, in *Hamilton Papers*, Library of Congress.

try than any other textiles.[14] Until checked by the competition of factory-spun cotton, household linen manufactures promised speedily to develop into an important commercial industry. Their geographical range was not limited, but as affording convenient articles of exchange in a country lacking currency they extended almost as widely as our national boundaries. The products of certain localities acquired trade names and reputations, and the term "Kentucky jeans," though it long ago lost its original meaning, remains even to-day reminiscent of the time when household fabrics held an important place in our domestic markets. Hosiery and other knit goods were made in families from homespun or factory yarn, to be sold to merchants or bartered with peddlers for other manufactures. During 1790 Ipswich households made nearly 42,000 yards of lace and edging.[15] Nail-making was partly a fireside industry until power machinery supplanted hand-labor in this employment. The government was informed, in 1791, that most nailers were farmers and followed their trade only in the winter, except in the towns of Bridgewater, Norton, and Taunton, where there were regular and steady establishments affording constant employment to a great number of workmen.[16]

These earliest household manufactures were undertaken on the initiative and with the capital of the workers.[17] When our industries became more mature, merchant employers and factories used family labor for operations not yet accomplished by power machinery. Early yarn mills distributed beams of warp and filling to country weavers to be made into cloth, thus affording household employment to hundreds of families in their neighborhood and even in remote localities.[18] Large vans circulated through New England and the Central States, leaving at farmhouses along the way bundles of straw plait to be sewed into hats and bonnets, and boot or shoe uppers to be closed and bound.[19] Before the war knitting-machines made the legs and feet of stockings separately and many country workers were employed to piece these together.[20] The making of garments was less an urban occupation than at present, and farmers' wives and daughters sewed and finished goods for city merchants, covered buttons, and even manufactured trimmings.[21]

[14] *Cf.* 344 preceding; La Rochefaucault, *Travels through North America*, II, 395; Pearson, *Notes on America*, 28. Nashville wholesalers still handled tow linens in 1845; advertisement of West and Scott in *Nashville Union*, Mar. 22, 1845.

[15] Inclosure in letter of Joseph Dana to George Cabot, Jan. 24, 1791, in *Hamilton Papers*.

[16] Inclosure in letter of Samuel Buck, Boston, Sept. 3, 1791, in *Hamilton Papers*.

[17] Cooper, *Information Respecting America*, 223–224.

[18] Bagnall, *Textile Industries*, 477, 494; *Bagnall Papers*, II, 1518–1519; III, 1743.

[19] *American State Papers, Finance*, II, 439; McLane, *Report on Manufactures*, I, 303; Mooney, *Nine Years in America*, quoted in *Documentary History of American Industrial Society*, VII, 72.

[20] *Memoirs of the Wool Industry*, 7–9. Sewing-machines centralized this industry; *cf.* Whitworth, *Special Report on the New York Industrial Exhibition of 1853*, 22.

[21] *E.g.*, McLane, *Report on Manufactures*, I, 312–313. Isaac P. Hazard of Peacedale made clothing for southern markets; R. Hazard, *Letter Book*, Feb. 27, 1835, to Sept. 30, 1844. But this manufacture was already centered largely in cities; Stuart, *Three Years in North America*, II, 31; McLane, *Report on Manufactures*, I, 464, II, 867.

None of these phases of home manufacture was novel in America, and some of them still survive, though transferred largely from the country to the city and from native to foreign workers. But they were more characteristic of our industrial development before the Civil War than they are at present, and mark transitional steps from homespun to factory organizaton.

Numerous as were the workshops that lined the village highways of New England at the close of the colonial period—obviously more numerous than custom trade alone demanded—they were to multiply still further after independence. During the four years that witnessed the adoption of the Constitution and the inauguration of the Federal Government their number in one Connecticut town more than doubled, and though specific instances may not represent precisely general conditions, all evidence points to an unusual activity of artisan manufactures at this period.[22] The distinction between makers of goods to order and makers of goods for sale, helpful as it is in broad definitions of industrial evolution, does not accord with actual periods of our manufacturing history.[23] Many minutemen of 1776 were summoned to arms from workbenches, where three generations of ancestors before them had manufactured hats, boots, chairs, and other articles for general markets. Nevertheless their descendants of the next generation, who erected at old mill sites the then novel machinery for manufacturing cloth by power, still carded neighborhood wool for toll and made it to order into flannels, kerseys, and broadcloths for the farmers who raised it.

Meanwhile, the merchants who shortly before the Revolution began systematically to organize industrial production by distributing materials and receiving finished goods from customers were not only exchangers of household manufactures, but also promoters of shops and factories. Many of them became virtually manufacturing employers, though they paid for work with merchandise and entirely by the piece, and their journals and ledgers were their only pay-rolls. We previously have mentioned this early practice of stores in giving out cotton to be paid for in yarn and shoe-findings to be paid for in shoes. Later, merchants provided not only materials but also implements for the operatives who supplied them with wares. Some ultimately became exclusively manufacturers; others remained promoters and organizers of industry. This mercantile influence, earlier alluded to in connection with capital and markets, appears repeatedly under different aspects in our manufacturing history. It pervaded all manufactures rather than characterized any particular group, and was so omnipresent that we might describe the antebellum period as a time when manufactures were integrating out of commerce.

[22] Letter of Alexander King, Suffield, Connecticut, Sept. 12, 1791, in *Hamilton Papers*, Library of Congress; *cf.* Crèvecœur, *Voyage dans la Haute Pensylvanie*, I, 232–233.

[23] *Cf.* Commons, in *Documentary History of American Industrial Society*, II, 23–31.

All stages of industrial development were contemporary in America, and the contrast they presented stood out more prominently because of the rapid social change that accompanied and caused them. Itinerant shoemakers and weavers plodded from house to house, making shoes and clothing for families from home-tanned leather and homespun yarn. Later, perhaps the same artisans established themselves in small shops, where they did custom-work for neighbors and finally accumulated capital to make goods for general sale. Journeymen in the full sense of the word thus became settled men and masters, and from this they grew, in some instances, to be merchants of the goods they made. Wherever population grew dense and money more abundant, journeymen found their first employment under master mechanics instead of in family service. Shops thereupon acquired more elaborate equipment and their operations were differentiated. Productive capacity rose until it exceeded the requirements of work made to order and even oversupplied local mercantile demands. The proportion of wage-earners relatively to self-employing artisans increased, and nascent industrial capital was engaged during slack seasons to keep men at work making goods against times of active trade. Thereafter followed an inevitable development of either the technical or the mercantile side of the shop's operations. It grew into a mill, and ultimately into a larger plant or factory, or else it was embraced by merchant employers as a subordinate unit in a wider system of commercial production.

The manufacture of boots and shoes illustrates best this order of development. Before the colonies became independent this industry already had passed through the homespun and into the shop and the domestic stage, and in Massachusetts and New Jersey was organized upon a commercial basis. General merchants controlled part or all of the output of artisans working at their homes or in small shops.[24] By 1786 there were masters who employed journeymen and other helpers on a piece-work basis, either as outworkers or at a central workroom, and who engaged in no other merchandising than that of the wares made by them or under their direction.[25] These master employers sold independently to general customers, to merchants, or to buyers for the western trade. They made shoes to order for individuals as well as goods for general sale, the former being of better quality and commanding higher prices than the latter. They supplied leather, binding, thread, and other materials to their workmen, but seldom provided tools, except for apprentices or occasional journeymen working at the head shop. Each outworker, with the assistance of his family, made complete boots or shoes, there being no division of

[24] In 1761, a regular trade with the South began, and the term "sale" shoes soon came into use; Bentley, *Diary*, IV, 424, Dec. 2, 1816; *cf.* 116, preceding.

[25] *Essex Antiquarian*, V, 201; *cf.* advertisement of James Osburn, *Maryland Journal*, Jan. 1, 1790.

operations among different workmen under the master's particular supervision.[26]

In Massachusetts some regional specialization occurred, the manufacture of women's shoes centering at Lynn, and of men's boots and shoes in the southern and western parts of the State. New Jersey and Pennsylvania also made relatively more men's than women's footwear. As markets extended the commercial side of the industry acquired increasing importance, and during the first fifty years of the Republic shoemaking fell into the hands of manufacturers, who organized production on a large scale, but on a domestic basis. They employed extensive capitals, distributed stock to workers at homes or small shops far from the warehouse, and soon began to divide operations among different classes of employees. At first, more to economize materials and transportation than labor, leather and linings were cut at headquarters. Later, stitching and binding uppers, and lasting and soling, became separate operations performed by two distinct corps of workers. With better organization came stricter inspection, which added importance to the central shop or embryo factory. The latter, in addition to an office and a packing and shipping department, contained stock rooms for sole leather, upper leather, trimmings, lasts, and bound shoes.[27] Usually only two operative departments were housed in the same building, those for cutting soles and for cutting uppers. The assembled materials for several dozen shoes were distributed to outworkers, and the finished goods were again collected by carriers who for their service received a percentage of the pay of the outworkers.

With the perfection of this system a change in the shoe market occurred somewhat similar to the change in the cloth market with the improvement of textile machinery. As wholesale production was perfected so as to compete in quality with custom-work, emphasis was placed on style and finish. This caused lasts to be standardized in size but to be changed in contour to suit the season's fancy. It became possible to buy ready-made boots that required less breaking in than formerly. These results were first approached through greater specialization of processes. Workmen learned to do rapidly and perfectly single things, such as heeling, or stitching soles, without knowing much about other operations of shoemaking. Such specialization made it necessary to assemble workers close together, because frequent handling of materials over long distances became too costly. Finally machinery began to displace these simplified manual processes. First came mechanical devices for cutting and rolling leather, then pegging machines, and finally sewing-machines, all introduced between 1840 and 1860.[28]

[26] Blanche Hazard, in *Quarterly Journal of Economics*, XXVII, 236, Feb. 1913.

[27] Sanitary Commission of Massachusetts, *Report*, 1850, 508–510.

[28] *Cf. Hunt's Merchants' Magazine*, IX, 584, Dec. 1843; XXIII, 574, Nov. 1850; XXXV, 126, July 1856; XLIII, 246, Aug. 1860; Wallis, *Special Report on New York Industrial Exhibition of 1853*, 35.

Though at first these were operated by hand, their installation required capital and their maximum economy was derived from continuous operation. Such influences, assisted by a tendency to centralize already under way, and by the example of other industries, made it inevitable that these mechanical aids ultimately should be assembled in factory buildings. This result was not accomplished, however, until power was applied to shoe machinery, a development postponed until the outbreak of the Civil War.

MILL AND FURNACE INDUSTRIES

Neither lumber and grain mills, nor the early textile mills that copied many of their features, presented phases of organization different from those of the previous century until canals and railways gave them access to broader areas of supply and distribution. The loss of foreign capital and transatlantic markets that accompanied and followed the Revolution destroyed the large colonial undertakings that gave premature promise of highly organized iron manufactures in America. Therefore, though joint-stock companies and corporations were formed for other enterprises, furnaces and forges, like flour-mills and sawmills, usually were owned by individuals or copartnerships. Iron works resembled lumber mills in their relation to raw materials, which in both cases involved ownership or control of timber areas. Such works were generally under the personal direction of their owner, who exercised absolute dominion over a large tract of territory. He cut the fuel for his furnace, mined its ore, and quarried its limestone upon his own lands. In addition to supplying his raw materials, he maintained a store, smithy, and usually a mill for his workmen. Little money was used, labor being paid in goods. The cottages of employees, grouped about the works and belonging to the proprietor, formed a settlement often remote from other communities. The iron master's feudal sway over lands, farms, furnace, forge, mill, store, and tenements might embrace even church and schoolhouse, and where slavery prevailed it included an owner's title to labor itself. Long credit on purchases and sales made him also a banker, whose fiscal work was confined mainly to short seasons once or twice a year, when books were balanced and accounts were settled.[29] Other mill industries sometimes were conducted in the same way, and what already has been said of their colonial organization sufficiently describes them until we come to the railway period. It is true that lumber, grain, flour, and iron markets grew up at several places, and more elaborate machinery of distribution existed than previously, but this did not affect materially the productive units that supplied these markets.

Possibly their continued association with agriculture and land own-

[29] John Birkenbine, in Philadelphia Engineers' Club, *Proceedings*, XIX-XX, 223.

ing, the strongholds of economic individualism, helps to explain why primary manufactures clung to earlier features of organization at a time when reproductive manufactures already trended toward coöperative proprietorship and management. The simpler technique of these industries also may have encouraged the persistence of small plants and individual ownership; their location in rural communities and their use of unskilled or semi-skilled labor likewise favored the same tendency. Glass works in the vicinity of large towns, deriving their materials in part from general markets, distributing their wares over large areas, and employing highly skilled operatives, were usually controlled by companies or corporations.

In case of iron, conditions began to change soon after 1830. The technical transformation of this industry with the introduction of puddling and coal-smelting, and its commercial transformation with the growth of railways, made large plants possible and economical. Control of raw materials and of transportation facilities to assemble them, concentration of several processes at a single point, and the requirements of a more complex sales system multiplied the demands for capital. Corporate organization therefore became more common than before, though until the Civil War it was not the prevailing form of ownership.

In 1839 the Great Western Iron Company was formed and invested $500,000 in land and works in western Pennsylvania. Six years later, after the failure of the original enterprise, the Brady's Bend Iron Company purchased this property, including nearly 6000 acres of mineral land and 5 miles of river front upon the Allegheny. It mined its own coal, ore, limestone, fire-clay, and fire-stone, made its own coke, and owned 14 miles of railway to serve its works. The plant itself consisted of 4 blast furnaces, a foundry, and rolling mills. It was equipped to perform all the processes, from getting raw materials out of the ground to delivering finished rails and metal shapes to consumers, and could produce annually between 10,000 and 15,000 tons of rails. It housed in its own tenements 538 laboring families. This company, with an actual investment of $1,000,000, was among the largest in America before the Civil War, though there were rival works of approximately equal capacity and similar organization.[30]

Early textile mills were little more than artisan workshops with a few added power appliances. The Scholfields began wool manufacturing at North Andover with a water-driven carding-machine in a one-story building 15 feet wide, and operated their spinning-jacks and looms by hand, probably in their residence.[31] Mills that could be run to full capacity by the owner and his children were not unknown.[32] Sometimes these occupied a single loft or apartment of larger establishments

[30] Brady's Bend Iron Company, *Report*, 1858.
[31] Bagnall, *Textile Industries*, 308.
[32] McLane, *Report on Manufactures*, I, 977.

that ground grain, sawed logs, or forged iron for the neighborhood.[33] Occasionally their operators worked up raw materials for local customers, and still oftener they stood in the same relation as household manufacturers to a city merchant. The latter provided cotton or wool to be made into goods for a specified price per pound or yard. He might even furnish the mill itself or part of its machinery, as earlier merchants and manufacturers had supplied wheels, hand-jennies, and looms to their household workers. Occasionally such merchant-owned mills were let periodically to the highest bidder—that is, to the manufacturer who would agree to make yarn or cloth from the owner's wool and cotton at the lowest rate. The operator employed his own help and was in effect a contractor similar to contract foremen in modern machine works.[34]

It is impossible to define precisely at what point the textile mill became a factory. Yet it is obvious that little spinning-shops of a few hundred spindles did not belong to the same class of industrial organizations as those at Waltham and Lowell. The question is not one of specialization, for sometimes minute establishments were as fully specialized as larger ones; nor is it a question of ownership, for important factories have belonged to individuals; nor of completeness of process, for the humblest undertakers in this field of industry made raw materials into finished cloth; nor altogether of size, for of two equally extensive establishments one might possess the features of a mill and the other of a factory. The definition depended rather upon a combination of equipment and organization. At one time an effort was made in this country to distinguish between spinners and manufacturers, the former term to apply to makers of yarn and the latter to makers of cloth; but the distinction did not come into general use.[35] However, from the introduction of the power-loom most textile establishments performing all the operations of cloth manufacture with power machinery were in effect factories, and in America at least they were made so by technical facts that determined their system of management and their organization of processes and labor. Plants devoted exclusively to spinning usually were smaller, more simply equipped, and situated in country communities. They followed the analogy of other mills in being owned by individuals or partners and in their relatively less systematic administration of labor. Factories displaced them first in New England, later in the Central States, and last of all in the South and West. Rhode Island at first dominated the American yarn market, later Pennsylvania, and finally the Carolinas. Mill

[33] Bagnall, *Textile Industries*, 434.

[34] Notices of all these manufacturing arrangements are found in the clippings from New England newspapers, gathered by S. N. D. North. Unfortunately, the titles and dates of these are, for the most part, lost. Some companies owning mills had their manufacturing done by a contractor; Ipswich Cotton Manufacturing Company, *Mill Accounts*, 1835.

[35] Bagnall, *Textile Industries*, 162.

organization was maintained in textile manufactures by the same influences that caused homespun and household industries to survive—isolation and neighborhood self-dependence. Southern yarns were made in order to employ family looms, and some mills in that section bartered cotton filling for linen warps spun on the wheels of the mountaineers forty years after the prejudice against cotton warps had disappeared from Rhode Island.[36]

THE FACTORY SYSTEM

The origins of the factory system were not identical in Europe and America, because this country lacked the antecedent industrial institutions of older manufacturing nations and had only hearsay knowledge of their industrial traditions. Abroad the system was a transformation of preceding manufactory and cottage industries already developed, specialized, and having features in common with factories themselves; in the United States it was in a sense a Yankee invention, the thought-out creation of minds that consciously adapted foreign suggestions to home conditions. Nevertheless American factories had a concrete as well as an ideal ancestry, and without these material antecedents efforts to establish them were abortive. The formal attempts made just before and after the Revolution to create ready-made manufactures were not successful. Such enterprises sailed unpiloted into an unexplored sea of technical and commercial difficulties. Other than business motives governed their policies and were urged to force the sale of their products. They besought the patronage of consumers on grounds of patriotism, and invoked the financial aid of legislatures on the plea of public policy. The Hartford Woolen Mill, the Beverly Cotton Factory, the New York Manufacturing Company, and the more pretentious enterprise inspired by Alexander Hamilton at Paterson terminated a short existence with the funds and the enthusiasm of their promoters. Such undertakings were more doctrinaire than practical, and represented a phase of industrial evolution which Great Britain and Europe did not share with the United States.

Nevertheless, these failures were predictions of future more fortunate adventures. They miscarried from lack of mercantile ability and technical skill. The country possessed both those resources, and to achieve success needed only their combination with the spirit of industrial enterprise already evident. The commercial foundation of our factory system was laid by those New England merchants who assembled household manufactures, at first casually and later with plan and foresight, for the plantation trade. With the growth of southern markets and the encouragement which independence gave domestic industry, this business became specialized. Almy and Brown, of Providence, began regularly to make linen-warp cloths for general markets, and,

[36] Landrum, *History of Spartanburg Co.*, 162.

finding a responsive and profitable demand, extended these operations and improved their equipment until they established the first successful cotton mill in the country. They chanced to be the pioneers, but all around them were others engaged in the same trade and making similar efforts to extend it. These business men contributed the needed mercantile element to factory undertakings.

Meanwhile, in Philadelphia and other cities, an operative population had grown up, employed in spinning and weaving for local customers. The manufactures conducted by these people were humble enough. They had little improved machinery, and their only advantage over country households was greater skill and productivity acquired from constant practice of their trade. These carders, combers, spinners, warpers, and hand-loom weavers contributed in the aggregate a considerable quotum to the coarse linens and similar goods shipped from Philadelphia to the South and West. They were destined for many years to play an important part in the economic life of that city and its neighbors, and to furnish a population from which were recruited not only operatives, but also many pioneer textile manufacturers of the Central States. Like the enterprises of New England merchants, these industries arose in response to an economic need, unsupported by government subsidies or by other motives than the profitable employment of capital and labor, and like them they became one of the living roots from which sprang our subsequent textile manufactures.

It was in textile industries that factories first appeared, and that the transitional steps by which they evolved from earlier forms of organization are most obvious. Flax, upon which was based the leading homespun occupation of the colonies, encountered the competition of cotton as soon as the latter was manufactured by machinery, and the displacement of homemade by factory goods was at first largely a displacement of linen by cotton fabrics. Therefore flax spinning and weaving did not develop beyond the household stage and disappeared with the family organization of manufactures. Wool met no similar rivalry from competing fibers, but the technical development of its manufacture was relatively slow. Carding mills sustained homespun and household industries longer than in case of cotton, and foreign fabrics maintained themselves better in our markets. These conditions prolonged the mill stage of woolen manufacturing in America until after the factory had been introduced in other industries.

On the other hand, cotton never supported independent homespun employments, because it could be manufactured by the family only in combination with wool or flax. The first power machinery successfully used to work it replaced immediately two hand processes, carding and spinning, instead of only the former, as in case of wool. Water-frames spun cotton into warp, which could not be done on hand-wheels, while

wool could be spun for both warp and weft in the family. Consequently such homespun and household manufactures of cotton as survived necessarily used mill yarn. For nearly twenty-five years after we received Arkwright machinery spinning was the final operation performed by power. This was the true mill period of the cotton industry, though already it was tending toward factory organization. Mill-owners at first gave out yarn to household weavers to make into cloth, later arranged for part of this work with contracting weavers, who assembled several looms in one building, and finally in some instances installed such looms as part of the mill itself. But so long as looms were operated by hand, in spite of economies of centralization, the tendency was for weaving to remain dispersed and mainly a household industry. In this part of his dealings the spinner was in fact a merchant manufacturer. His mercantile functions consisted in trading store supplies for labor embodied in hand-woven cloth, as earlier merchants exchanged goods for labor embodied in wheel-spun yarn.[37] Such mills might in time have acquired factory features, as did establishments devoted exclusively to spinning in Great Britain; but before this opportunity came a new invention and a new example carried their development into another phase.

These were the invention of the power-loom and the system of organization introduced with it at Waltham. The Boston Manufacturing Company erected the first modern factory in America. It differed from previous establishments of equal size, either here or abroad, in performing all operations of cloth-making by power at a central plant. Labor was specialized and workers were organized by departments. Wages were paid in cash, output standardized, cost accounting introduced, and buying and selling systematized. In a word, the commercial, technical, and operative elements of a factory were brought together in accordance with an intelligent plan and so coördinated as to make a more efficient producing unit than had hitherto existed in this country. Manufacturing was specialized completely and no longer retained even subordinate relations with household industry or general merchandising. The idea of the factory, as we know it, was conceived and demonstrated so that its application at other places and to other industries was a mere matter of adjustment.

A personal element entered into this development and shaped its subsequent course. Bargaining skill had determined the control of industry. The custom artisan who bargained most shrewdly with his patrons was likely to become an employing artisan making goods for sale, who bargained with both buyers and workmen. Merchant employers and mill-owners bargained with buyers, and with their workers in the two capacities of employees and consumers, thus trebling their

[37] *Cf.* Letters of May 1 and July 17, 1809, in Almy and Brown, *Manuscript Letter Book*. This practice continued in the South until the Civil War; Olmsted, *Seaboard Slave States*, 507.

avenues to profit. This had been a period of shop-keeping industrialists. But factories, that focused their attention on wider circles of commerce and generalized relations of mechanical production, called for a new order of ability. Bargaining itself was no longer of the market stall, but rather of the exchange. The habit of mind of the artisan and the small trader is not speculative, nor is he apt to take comprehensive views of economic movements. Something of the courage for adventure acquired or evidenced by far-flung undertakings, and of the philosophic type of reasoning cultivated by formal education and travel, were needed to inspire a new system of industrial organization. These qualities were combined in Francis Lowell, who was a Harvard graduate, who in youth acquired a fortune by foreign commerce under conditions that required unusual business foresight and intrepidity, and who had resided abroad, where he had studied and pondered upon industrial problems.[38] Lowell became the leader of a group of Boston capitalists of similar temperament and experience, possessing enough of the spirit of prophecy to anticipate opportunities and of the genius for practical affairs to utilize these successfully, who from 1815 to 1850 controlled the manufacturing development of New England and less directly by their example guided that of the whole country.

Our factories differed from those abroad in combining spinning and weaving, and even dyeing and printing, in one establishment. In Great Britain a traditional separation of these occupations perpetuated itself in business customs and plant equipment. Each practice probably suited better the country where it prevailed. Our factory-owners usually controlled the water-powers they employed and were averse to sharing them with other manufacturers. In England, where power control was more dispersed, partly on account of the greater use of steam, this motive did not prevent the juxtaposition of independent establishments for different textile processes. American manufacturers, making uniform coarse fabrics, depended more on machinery and less on operative skill than foreign makers of fine goods, and this emphasis of mechanism favored centralized production. Our market organization and domestic trade customs, which were adapted to a less elaborate system of exchange, also contributed to this result. Moreover, the example of Waltham, which governed factory organization at Lowell, Manchester, Lawrence, and other large textile centers, favored a continuance of the same policy. Some departures from it occurred at Fall River, Paterson, and Philadelphia, where the conditions just described prevailed in a less degree.[39] In contrast with this, American machine-shops at this time specialized in standard products less than those of England and concentrated fewer operations in a single system.[40]

[38] Appleton, *Introduction of the Power Loom*, 14.
[39] *Cf.* Great Britain, *Parliamentary Papers*, 1833, VI, 171, question 2685.
[40] Whitworth, *Special Report on New York Industrial Exhibition of 1853*, 5.

Small mills of the older type did not disappear, and a few are in operation even to-day, performing functions omitted by factories. The economy of factories was limited to making goods in large quantities. This confined their early product to plain cotton domestics, for which there was ample home demand. At this time other goods of large consumption could not be made by power machinery. Therefore, though the practical advantage of factories was evident, their broader service waited upon new inventions and wider markets. In Rhode Island, where the mill system was well established, and elsewhere in small towns whose natural conditions reinforced their conservatism, the mechanical organization of the factory was gradually adopted without the improved labor administration of Waltham and Lowell. These establishments ceased to be merchant employers, but nevertheless retained the truck system. This was not due to custom alone, but also to the causes that perpetuated the same system at iron works—scarcity of currency, desire to stabilize labor, and profit to proprietors. Nevertheless, mill-stores were historically a survival of the period of merchant employers. The first in America were virtually branches of the trading firm of Almy and Brown, who had been merchant manufacturers before they were mill-owners. Industrial feudalism persisted likewise in factories of the Waltham type, but assumed less mercenary forms. Perhaps a trace of New England idealism assisted this betterment. However, it was due mainly to the less insistent oversight of petty spendings and winnings that large corporations, as compared with small corporations and individuals, gave such enterprises, and to the need of attracting labor.

For twenty-five years after Slater began making yarn at Pawtucket typical American cotton mills ran less than 500 spindles. In 1815 only half of the 167 mills in Rhode Island exceeded that number, and ten years later the average equipment in New England was but 700.[41] About that time, however, these figures began to be increased by the concentration of machinery in factories. In 1831 the number of spindles per establishment in the United States was over 1,500, in 1840 it approached 2,000, and in 1860 it was nearly 5,000.[42] Until 1830 the tendency to dispersion was equal throughout the country. Virginia and Massachusetts mills, and Maryland and Rhode Island mills, had about the same number of spindles. With factory organization came a more definite geographic localization of large plants. According to the census of 1860 an average cotton factory in New England contained nearly 7,000 spindles, in the Middle States 3,000, and in the South and West less than 2,000. Naturally this was accompanied by a growing disparity in the size of neighboring establishments. In 1812 the largest

[41] Rhode Island Society for Encouragement of Domestic Industries, *Transactions*, 1863, 73–77; *American Textile Manufacturer*, I, 85, May 1880.

[42] Computed from tables in the *Journal* of the New York Convention of 1831 and in McLane's *Report on Manufactures*, and from U. S. *Census Reports* for 1860 and 1870.

cotton mill in the Union was at Baltimore, with 8,000 spindles, while the two principal mills in New England each had 5,000.[43] Before 1840 the Merrimac Company operated 38,000 spindles, besides 1,300 power-looms and large print works.[44] Though this company doubled its machinery by 1860, and powerful rivals grew up at Lowell and elsewhere, the 100,000-spindle factory did not arrive until the Civil War.[45]

From the time that, with the introduction of water-carding, woolen manufactures entered the mill stage, spinning and weaving were associated more closely than in case of cotton. This was due to the greater skill required, and to the power machinery used, for finishing woolen cloth. In America transportation was more difficult and allied industries were more dispersed locally than in England. Consequently, the economy of conducting all process under one roof was relatively greater in the United States, especially where initial and final operations, like carding and fulling, were performed at the same establishment. In other respects, however, the organization of woolen manufactures followed rather than anticipated that of cotton. Some features of a factory organization existed at Humphreysville, and at the Middleton steam woolen mill, as early as at Waltham, though cloth was still woven by hand.[46] About ten years later the Hamilton Company, at Southbridge, used automatic looms for weaving woolens and combined all the processes of power manufacture in a single comparatively extensive plant.[47] However, the Middlesex Company, organized at Lowell in 1830, was the first woolen establishment to adopt fully the Waltham system.[48] While small mills remained relatively more important in this branch of manufacture than in cotton spinning and weaving, the largest textile factories in America before 1860 made woolen goods. The Bay State Mills, at Lawrence, began operations in 1848 in three 9-story buildings, the largest nearly 1,500 feet long, with 15,000 cotton spindles, 65 sets of woolen cards, and 1,000 looms.[49] Five years later the Pacific Mills were incorporated in the same city to manufacture dress goods of both wool and cotton. At first they employed 1,000 looms, with the preparatory machinery to keep them fully employed, an equipment increased by the close of the Civil War to 100,000 cotton and 16,000 worsted spindles and 3500 looms.[50]

[43] Bagnall, *Textile Industries*, 494.

[44] Montgomery, *Cotton Manufacture*, 166, 170.

[45] Among the larger mills of this period was the Baltic Mill, at Sprague, Rhode Island, with 75,000 spindles; *American Textile Manufacturer*, I, 224, Dec. 1881.

[46] North, "New England Wool Manufacture," in *The New England States*, 246; Bishop, *History of American Manufactures*, II, 180; *Bagnall Papers*, II, 1219.

[47] North, "New England Wool Manufacture," in National Association of Wool Manufacturers, *Bulletin*, XXXI, 278, Sept. 1901; *cf.* McLane, *Report on Manufactures*, I, 536.

[48] National Association of Wool Manufacturers, *Bulletin*, XXXII, 314, Dec. 1902.

[49] National Association of Wool Manufacturers, *Bulletin*, XXXIII, 154–157, June 1903; Wallis, *Special Report on New York Industrial Exhibition of 1853*, 76.

[50] *Hunt's Merchants' Magazine*, XXXI, 768, Dec. 1854; U. S. Census 1860, *Manufactures*, 27.

Shortly before the Civil War factory organization extended into other fields of industry, especially branches of wood and metal manufacture requiring the mechanical production of uniform and interchangeable parts. Establishments for making firearms, agricultural implements, sewing-machines, musical instruments, clocks, and watches increasingly resembled textile factories in their wide use of power-driven automatic machinery, their systematization of processes, and their administration of labor. The last of these industries afforded the most remarkable as well as the most representative illustration of this development. Until the middle of the century practically all the watches used in America were imported. Foreign manufacturers assembled and fitted watch components purchased from numerous scattered shop artisans, each of whom devoted himself to making a single part. Every operation was performed by hand, and its perfection depended upon the personal skill of the workman. This system was never introduced in the United States, where organized watch manufacturing was not economically possible except under different conditions of production.

From the time Connecticut manufacturers began to make firearms with interchangeable parts, mechanical metal-working advanced rapidly in this country and attained constantly higher standards of accuracy. But until 1850 no one ventured to apply this method to the delicate mechanism of a watch. That year the Boston Company was formed, and after initial failure and financial reorganization, succeeded in making watches by machinery. Its plant was at Waltham, where, 35 years before, the New England factory idea originated.[51] Immediately the economy of the new system was manifest. Money was saved by the wholesale purchase of materials and by the avoidance of unnecessary transfers, since every operation was concluded within a single building. American operatives with little training were enabled to turn out in an equal period four times as many watches as European workmen with the instruction and experience of a lifetime. Moreover, these watches were as accurate and reliable as those made abroad. They could be repaired easily by the substitution of a standard part in case of wear or breakage. Such advantages made inevitable the extension in America of this system of manufacture and its accompanying factory organization. Watch-making differed from textile industries in having no preceding phases in this country; rather it resembled manufactures like those of sewing-machines, founded on new inventions, which started after the economy of the factory system was understood and never were attempted in any other manner.

Before the factory period the operative population of the United States was small; therefore this new system of production did not create as serious social problems as in countries with previously exten-

[51] *Cf.* 420, preceding.

sive industries. However, the influence of factories on the welfare of workers lies without the province of this history.[52] The discipline and subordination of factory life ran counter to American individualism, but this was overcome by employing many women and by imitating in the control and regulation of labor the still stern domestic regimen of the Puritan household. So long as most operatives were natives the social aspects of factory employment, at least in the large establishments that represented the highest development of this system, were satisfactory; indeed they were better than at present, when immigration with its resulting differences in language and custom has weakened ties of sympathy and understanding between employers and employed.

The economy of factory production varied with the technical progress and economic environment of each branch of manufactures. Its final purpose was to enlarge the output of labor, and this in some cases was accomplished in the ratio of 50 to 1. Such a motive was especially powerful in America, where man's effort to subdue nature was stimulated by the very magnitude of the task presented. Consequently, the growth of factory organization relatively to total manufactures was more rapid in this country than abroad. This may have been due partly to a native faculty for coöperation, fostered by democratic institutions and by that spirit of mutual enterprise, not inconsistent with individualism, which life in new communities develops; but in the main it responded to the more strictly economic causes already alluded to or described. So far as this movement was measured by the centralization of manufactures, it was evidenced in statistics by the fact that though manufacturing product increased by leaps and bounds, in case of our most highly developed industries the number of establishments, after rising continuously for several years, began to decline.

CONTROL AND ADMINISTRATION OF INDUSTRY

Although early in the last century manufacturing corporations became numerous, most mills and factories continued to be owned by single proprietors, partners, or unchartered joint-stock companies. Some establishments began as individual enterprises, later came under the control of a company, and after years of successful existence finally adopted corporate organization. But big industrial undertakings usually commenced business under corporate management. This form of control first beeame general in cotton manufactures, later in other textile branches, and last of all in iron works. Geographically, corporate ownership was characteristic of the Waltham-Lowell type of factories, and from these extended to other large enterprises in

[52] *Cf.* Wright, *Report on the Factory System of the United States*, U. S. Census 1880, *Manufactures.*

Massachusetts, New Hampshire, and Maine, while individual or joint-stock ownership was relatively more usual in Rhode Island and some of the Central States.[53]

During the formative period of industrial corporation law the difference between unchartered and chartered companies was less than it is to-day. A joint-stock concern was essentially an enlarged partnership, and sometimes originated from a simple partnership through subdivision of ownership by sale and inheritance; but more commonly it was organized by a formal agreement under which a number of persons contributed capital to conduct a business. The shares might represent either fixed sums of money or, as in case of colonial mills and iron works, fractional parts of a property. The agreement usually defined the term of existence of the company, which might be renewed from time to time and, so far as was legally possible by private contract, it limited or defined the liability of shareholders.[54] Shortly after the Revolution such companies were formed in some Connecticut towns to deal in homemade linens, "the stock at all these places being raised by subscription, and managed by an agent for the benefit of the adventurers." These companies possibly handled raw materials and engaged directly in making goods, but their initial motive was commercial; some are referred to as "merchants trading in company," and their form of organization may have been suggested by the earlier custom of taking shares in vessel cargoes and similar ventures.[55]

Another ancestral line of industrial corporations leads back from joint-stock companies to the quasi-public manufacturing societies, started before and immediately after the Revolution. These were financed by limited subscriptions and retained from the tradition of their earlier charitable objects the practice, usual in public welfare bodies, of administration by a board of guardians or directors.[56] Therefore, both the philanthropic trustee and the captain, supercargo, or other commercial agent, were prototypes of the managers of industrial companies. The original agreement of the Coventry Cotton Company specified in the articles themselves the name and compensation of its agent, while the incorporated Norfolk Cotton Factory was managed personally by its directors.[57] As early charters did not limit the liability of stockholders, the principal advantage of incorporation was simpler and surer representation in legal processes, which facilitated the collection of debts.[58]

The shares of corporations that began as joint-stock companies were

[53] McLane, *Report on Manufactures*, I, 927.

[54] Bagnall, *Textile Industries*, 405.

[55] *Succinct Account of Manufactures in America*, manuscript enclosure with letter of P. Colt, July 21, 1791, and Letter of Chauncey Whittlesey, Sept. 27, 1791, in *Hamilton Papers*, Library of Congress.

[56] *Cf.* 183–184, preceding.

[57] Bagnall, *Textile Industries*, 405, 485.

[58] *Cf.* North, "New England Wool Manufacture," in National Association of Wool Manufacturers, *Bulletin*, XXXII, 126–127, June 1902.

usually in small denominations, sometimes not exceeding $25, while the stock of the Waltham-Lowell companies had par values ranging from $500 to $1,000. But some of the small-share companies were dominated completely by a few large stockholders, and there is no evidence that during the early years of our organized manufactures the size of shares bore a consistent relation to distribution of ownership. One of the most marked examples of concentrated stock control was the Middlesex Company, which for ten years after its organization was owned exclusively by three proprietors.[59] Some later charters contained clauses terminating their existence when a majority of the stock became the property of a single person or when four-fifths of the shares fell into the hands of five or less owners; and also the number of shares that could be voted by one person was limited.[60] The articles of at least one early cotton-manufacturing company provided that parties owning an interest in it should not become concerned directly or indirectly in any other undertaking of the same character.[61] But from the time Lowell was founded, and even earlier, there is no more prominent feature of industrial organization in New England than the community of interest that prevailed among large corporations engaged in cotton manufacturing. Owned by the same coterie of capitalists, adjusting their products so as to avoid competition with each other, interchanging patent rights of which they as a group held a monopoly, and selling their output through the same channels, they formed an industrial complex of redoubtable solidarity.[62]

Some charters empowered their recipients to engage in different kinds of manufacturing, and even combined banking with industrial privileges; but many big companies formed later were organized in fact for narrowly defined objects, though this was not stated explicitly in their articles of incorporation.[63] Such community of ownership and specialization of purpose might constitute a more refined and subtle method of restraining trade than the earlier direct combinations of manufacturers and merchants, but this possibility was at first obscured to popular view by the admiration which the young nation felt for the achievements of its new industrial leaders; nor, indeed, did appreciable evils for a time appear from these conditions. Certain economies peculiar to small enterprises, the impossibility of engrossing either the redundant natural resources of the country or its rapidly expanding markets, and the manufacturing opportunities offered in the West, combined to check the sensible oppression of minor enterprises by their larger neighbors.

[59] *Bagnall Papers*, IV, 2526, 2527.
[60] Charter of Crescent Manufacturing Company, in the *Report* of the Company, 1854; Virginia, *Laws*, 1854; Massachusetts, *Special Laws*, 1805, III, 586.
[61] Bagnall, *Textile Industries*, 405.
[62] *E.g.*, *Bagnall Papers*, III, 2220–2222; Appleton, *Introduction of the Power Loom*, 24.
[63] *Bagnall Papers*, III, 1980–1981, 1991.

Two important New England manufacturing towns, Lowell and Fall River, were controlled by single companies and their allies, and their managers discouraged, if they did not prevent, the establishment at those places of independent competitors.[64] Shortly after 1820 an attempt was made by the Taunton Manufacturing Company similarly to monopolize the industrial activities of that city, but without success.[65] The Amoskeag Company, at Manchester, assimilated two neighboring companies by purchasing them, issuing for their stock its own stock in exchange.[66] For several years close community of interests existed between the power and manufacturing companies at Lawrence and those at Lowell. In Rhode Island and southeastern Massachusetts wealthy mill-owning families like the Slaters, then the Sprague, and more recently the Knights and Bordens, acquired control of groups of factories, which they welded under their personal management into great aggregations of related industries directed by a common policy.[67] Somewhat later similar dominant mill families arose in the cotton-spinning districts of the Carolinas.

These alliances and amalgamations never became monopolies and were not effective as price-fixing agencies. The agreement among the first cotton-spinners in Rhode Island to regulate the price of yarn, to which Moses Brown refers in his correspondence, and a later attempt of northern manufacturers of flannel to depress quotations at certain seasons in order to discourage importations, are the only specific attempts to regulate textile prices of which we have knowledge.[68] The small mills of Pennsylvania, the Ohio Valley, and the Piedmont region were difficult to organize for territorial as well as commercial reasons. They were preoccupied with local markets so isolated as to be protected from competitors. They were too widely separated, too suspicious of outside interference, and too little interested beyond their neighborhood concerns, to take part in larger projects of administration and market control. Wool manufacturing, relatively more dispersed than that of cotton, was also less efficiently organized. Its more primitive management probably was related to the sources from which it derived its capital. In 1855 Providence money sustained 77 cotton mills, 4 print works, and 2 bleacheries tributary to that city, but only 3 of the 75 woolen mills in the same vicinity.[69]

Our pioneer mills were under immediate oversight of technical rather than commercial men, and this practice continued so long as yarn was

[64] Cowley, *History of Lowell*, 62; Peck and Earl, *Fall River and Its Industries*, 63–64; *Bagnall Papers*, III, 1944–1945.

[65] *American Wool and Cotton Reporter*, XIV, 1454.

[66] *American Wool and Cotton Reporter*, XIV, 1314.

[67] *American Wool and Cotton Reporter*, XVII, 130; *Bagnall Papers*, II, 1402–1431.

[68] Letter to Pratt and Durant (Albany), March 29, 1810, in Almy and Brown, *Manuscript Letter Book; American State Papers, Finance*, V, 819. In 1783 an unsuccessful effort was made to control the price of iron; *Pennsylvania Magazine of History*, V, 79, Jan. 1881.

[69] Providence, Census of 1855, 62–63.

their principal product.[70] Commercial qualifications acquired more importance in factory management as establishments enlarged, corporate ownership increased, and cloth became the main article marketed.[71] Directors of corporations were not always residents of the neighborhood in which their business was conducted, and the operations of companies grew too extensive and complex to be supervised personally by them. When the Boston Manufacturing Company was formed at Waltham, the treasurer, who was a financial and commercial man without special knowledge of manufacturing, was made the managing officer of the corporation. He was intrusted with the appointment and control of the mill superintendent and alone was responsible immediately to the directors.[72] The Merrimac Company, after having been managed by men of mechanical training for ten years, placed a merchant at the head of its operations, and regularly thereafter subordinated technical to general executive ability in its choice of superintendents. This became the general practice of companies organized upon the Waltham-Lowell plan, while in other parts of the country it was more usual for the mill superintendent, who controlled the mechanical operations of the factory, to exercise coördinate authority with the treasurer, who directed its financial and mercantile activities.[72]

For many years Baltimore, where the memory of the Principio Company maintained the tradition of big industrial undertakings, was the only southern city having large incorporated manufactures. Cotton planters lacked experience in business coöperation. In 1833 the Vaucluse Company was chartered in South Carolina to manufacture cotton and woolen goods. For nearly three years, during which machinery was bought and a factory erected and operated—at a loss—the directors did not hold a single meeting. The only two times they ever assembled were to organize, and to authorize the sale of their property under pressure of impending debts.[73] But fourteen years later, in the same vicinity, the Graniteville factory, following closely the plan of the Lowell companies, demonstrated by its success that the South at last understood how to manage corporate undertakings. In fact, during the decade just before the Civil War, the organization of cotton manufactures in that section began to differentiate as it had in New England. North Carolina became a region of small mills, owned by individuals and managed by practical manufacturers, while South Carolina and Georgia became the seat of corporations with wider commercial connections, manufacturing cloth on an extensive scale.

The relative economy of individual and corporate control of manufactures was a subject of much discussion, in which either side could cite instances of success and of failure supporting its contentions.

[70] *American State Papers, Finance*, v, 813; *Bagnall Papers*, III, 2130–2131.
[71] This proved true also in England; Chapman, *Lancashire Cotton Industry*, 162.
[72] *Bagnall Papers*, III, 2012, 2013, 2183, 2247–2249.
[73] Gregg, *Domestic Industry*, 34.

Opponents of corporations assailed both their efficiency and their morality. The attacks on these companies that accompanied the campaign against the tariff of 1828 were based partly on the latter grounds. A New Hampshire Senator recounted in Congress how numerous small stockholders in his State had been robbed of their investments in a million-dollar factory by a few large capitalists, who had manipulated the company's affairs so as to secure its property under a mortgage for one-third its cost and then had reorganized.[74] Thirty years later similar charges were repeated against the managers of Lowell and Lawrence companies. Originally these factories were owned by a few men, who had large sums invested in them and personally watched over their operations. But gradually the stock became widely distributed. Within twenty-five years the 15 early owners of the Merrimac Company—one of which was the Boston Manufacturing Company, which held one-fourth the original capital—increased to 390.[75] By the time of the Civil War the average holding in these large companies had declined to $3,000. Their charters and the general corporation laws, based upon the theory of immediate supervision by the owners, provided inadequate protection against the loose management and stock-jobbing which this new condition made possible. It was asserted that a small clique of Boston capitalists by improper methods perpetuated voting control of these corporations, in which they owned a comparatively small amount of stock. They induced stockholders to sign proxies in their favor when they signed their dividend receipts. They also held annual meetings in small rooms to which but a fraction of the shareholders could get access, and called meetings of several companies at different places for the same day and hour, in order to divide the opposition of independent men who owned stock in a number of companies. Less than a score of Boston capitalists were said thus to dictate the fortunes of most of the great manufacturing corporations of the State, and one man was cited who was director of 23 companies and president of 11. The same coterie owned a Massachusetts life-insurance company, which with a capital of $500,000 controlled nearly ten times that amount of investment funds. Having forced factories by mismanagement to accept loans from this company, they either foreclosed or used their power to depress stock for their own benefit. The other spoils of this control were high-salaried offices and exorbitant agents' commissions.[76] These charges can not now be verified in detail, but they recite evils to which corporations, in spite of remedial legislation, still are subject; to which they were even more liable at a time when public control of their operations was as yet inchoate, and which by their possibility bore directly upon the econ-

[74] Isaac Hill [New Hampshire], *Speech in U. S. Senate upon Mr. Clay's Tariff Resolutions*, 2; McLane, *Report on Manufactures*, I, 684.

[75] Atkinson, *Facts and Figures*, 95.

[76] Ayer, *Uses and Abuses in the Management of Corporations*.

omy of this form of industrial organization. The abuses mentioned are sufficient of themselves to explain the low dividends of some companies during the decade ending with 1860.

About the same time a manufacturing depression in New England evoked a searching criticism also of the relative efficiency of individual and incorporated enterprises. The latter were said to be wrong in theory because corporation investments were made on grounds of general confidence rather than from personal acquaintance with particular industries. This confidence stimulated factory building most in times of booming trade and overexpansion, thus accentuating the evils of the latter. It created a demand for immediate returns, which resulted in hurried construction and ill-planned installation, caused scarcity of labor, raised wages beyond the point of profit, and ultimately led to overproduction. This was an explanation for the undue extension of cotton factories before 1847. On the other hand, individual owners became conservative in times of too active trade and high prices, and took advantage of the opposite conditions to enlarge their works. The Sprague had erected a 50,000-spindle mill in Rhode Island while labor and materials were cheap, when no corporation could have raised capital for such a project. Therefore they earned better profits because of their relatively small investment in plants as compared with their incorporated competitors. A distinction should be made between large establishments of natural growth, which were mostly owned by individuals, and large corporate enterprises created *ex machina*. The former benefited by economies of wholesale production, while the latter dissipated these advantages through inexperience and faults of organization. Corporate capital drawn partly from other sources than manufacturing, and controlled from commercial centers rather than at the mills themselves, must always be subject to speculative interests detrimental to the best industrial results.[77]

These criticisms seemed at the time to be substantiated by the recent failure of one of the largest companies at Lawrence, and by the depression accompanying the crisis of 1857, in which corporations suffered perhaps more severely than individual enterprises. Partly also this questioning attitude was due to a transitional stage in the development of our industries, the cause and outcome of which were not yet foreseen. Our first manufacturing corporations had been necessitated by lack of individual capitals and had been inspired in part by local pride and public-spirited motives.[78] Then came a period when private fortunes were large enough to support undertakings of adequate size. By comparison these often proved better managed and more profitable than those conducted by corporations. But shortly before the Civil War

[77] Bigelow, *Remarks on the Depressed Condition of Manufactures in Massachusetts.*

[78] Their success in America appears to have been relatively greater than in Great Britain. See quotation from *The London Magazine*, in the *Report on the Subject of Cotton and Woolen Manufactures and the Growing of Wool in North Carolina*, by a committee of the legislature.

railways and technical progress encouraged many new ventures into corporate organization. Some of these were unsuccessful. The abuses of management previously mentioned, though not fully revealed, caused popular distrust. Conscious of an economic impulse towards centralized production under company control, but resisting that impulse through attachment to established usages and appreciation that the new tendency was not without dangers, industrial leaders reviewed the conditions in accord with which they must shape their policies even more critically than during the earlier and somewhat similar crisis thirty years before.

Though the case against corporate organization was theoretically strong and was supported by many specific facts, we see at our later day that it failed under the test of practical experience.[79] As a group the Lowell factories were very successful and enjoyed more stable prosperity than any other equally extensive body of industries in the country. In Great Britain individual ownership had proved more efficient than corporation control; and for a time this was the experience almost everywhere in America outside the Merrimac district.[80] Our iron industry remained under the management of individual proprietors, and our woolen factories, after starting in many cases as corporations, for the most part returned to the simpler form of organization. Large capital, a peculiar system of manufacture, and unusually skillful business management explained the success of highly centralized factory production in Massachusetts.

In a defense of this system, when it was under attack in 1858, Nathan Appleton dwelt especially upon the element of capital. Erastus Bigelow, almost equally prominent in the industrial history of the State, had asserted that "under the present corporate methods of bringing together capital and skill, Massachusetts can never, as a manufacturing community, attain to a high degree of productive power; that she can never maintain even a respectable position in competition with the private enterprise of her foreign rivals." Appleton held that the main trouble with unsuccessful corporations was inadequate operating capital, and that "manufactures cannot be carried on to any great extent in this country in any other manner than by joint-stock companies. A large capital is necessary to success. Individuals possessing sufficient capital will not give themselves up to the pursuit. It is contrary to the genius of the country."[81]

The greater success of private ownership in Great Britain was due partly to more abundant capital; but in that country it had not prevented the same over-expansion of industries that occurred in America,

[79] *Cf.* North, *New England Wool Manufacture*, in National Association of Wool Manufacturers, *Bulletin*, XXXII, 306, Dec. 1902.

[80] Mantoux, *La Revolution Industrielle*, 246; Bigelow, *Remarks on the Depressed Condition of Manufactures in Massachusetts*, 7; *Hunt's Merchants' Magazine*, XX, 54, Jan. 1849.

[81] Appleton, *Introduction of the Power Loom*, 30.

and indeed in this country had been as marked in individually owned iron works as in cotton-manufacturing corporations. Moreover, English manufacturing was subdivided into specialized processes, each of which might be conducted in an establishment managed by a single proprietor. During their early history the Lowell companies occupied a peculiar field, that of making coarse cloth, which at that time was susceptible of higher technical and commercial specialization than any other branch of manufacture. When like conditions later arose in other industries, they too adopted, together with a similar system of production, corporate ownership and administration. Iron-making entered this new stage when large rolling and rail mills became an integral part of the furnace plant. Woolen manufactures resumed it, in one notable example, with the Bay State Mills at Lawrence. Though the panic of 1857 brought failure to the latter enterprise—in company with many individually owned woolen factories, and some incorporated cotton factories in the South—the Pacific Mills in the same city survived this crisis to become for many years one of the largest and most successful manufacturing corporations of the country.[82]

Obviously the course of industrial organization was already determined by the centripetal forces that to-day are descernibly reconstructing society through its economic approaches. In 1794 Tench Coxe described our manufacturers as farmer craftsmen; in 1825 Zachariah Allen described them as village artificers; and in 1860 they were rapidly becoming city operatives.[83] As industry was centralized, it also was specialized, for in that direction—with less regard for social than productive ends—lies the greater efficiency towards which for more than a century it has been involuntarily and ceaselessly impelled.

[82] *Cf.* North, *The New England Wool Manufacture*, in *The New England States*, 227–229.
[83] Coxe, *View of the United States*, 443; Allen, *Science of Mechanics*, 352; Williams, *An American Town*, 65–69, 194.

CHAPTER XVIII

DISTRIBUTION AND VOLUME OF MANUFACTURES

General distribution by localities, 464. Wool-using manufactures, 467. Agricultural implements, 476. Manufactures using farm products as raw materials; distilling, packing, tobacco, sugar, 479. Illuminants, 492.

GENERAL DISTRIBUTION BY LOCALITIES

The geographical distribution of industries has both a national and a neighborhood aspect. Its general features are determined by such obvious causes as density of population, trade routes, raw materials, water-powers, and competing occupations; but the centering of particular manufactures in certain localities seems sometimes to have been as accidental as the casual dropping of a seed in the favoring soil of the wayside. No doubt surrounds the influences that predisposed eastern Massachusetts and Rhode Island to industrial pursuits, but it was a matter of chance that Danbury, as early as 1791, was noted for its hat-makers, and that in 1803 Gloversville already had begun the industry from which it takes its name and of which it still continues to be an important center.[1]

New England's advantages for manufacturing were close settlement, a population apt with machinery, numerous easily developed water-powers, and an active commerce. It did not possess in a remarkable degree the materials that employed its operatives and artisans. The Delaware Valley added to these conditions more abundant and varied mineral resources and immediate command of important lines of communication to the interior. But in that region agriculture as well as commerce competed actively with manufactures, and ready access to the West drew off the surplus population. New England's rate of progress slackened appreciably early in the century, until quickened by the enterprise of its mill-builders; but the growth of the Delaware communities never paused for want of channels to employ their labor. The valley of the Mohawk and the upper valley of the Ohio became industrial districts of importance. South of the Potomac the progress of specialized manufactures was slow. That part of the Union influenced industry principally as a source for raw materials and a market for finished goods. However, about 1800, before its development was arrested by slavery, the Piedmont district of Virginia and Carolina promised to become a manufacturing region. Even in

[1] Letters of Joseph F. Cook and of O. Burr and Company, Danbury, Sept. 12, 1791, in *Hamilton Papers*, Library of Congress; Bishop, *History of American Manufactures*, II, 101; *cf.* also Fuller, *Connecticut as a Manufacturing State*, 15, 19.

sections where manufactures were most active agriculture and commerce long remained the principal occupations, and prior to the Civil War the social and business habits of the country as a whole were affected but slightly by the industrial pursuits that employed a minority of the population. Nevertheless during this period many undertakings were begun that, although too small to impress themselves upon the community where they were situated, subsequently became the leading or characteristic industries of their vicinity; and during these years we may mark with increased definiteness two phases of the distribution of manufactures—the growth of centers of diversified industry and the concentration of particular lines of trade in one locality.

The numerous handicrafts that evidenced the varied industrial life of our colonial towns eventually developed into systematized manufactures. Under urban influences a cabinetmaker's shop became a furniture factory and a smithy expanded into engine works. To trace completely the history of this process would involve us in a multitude of details. Certain groups of manufactures, such as meat-packing, sugar-refining, rum-distilling, the engineering trades, furniture and piano making, and printing and publishing, prospered best in city surroundings. Their first requirement was special facilities for assembling materials or immediate touch with a consuming market. Commerce was so much more important than manufactures in our national economy that it determined the location of our principal cities, and none of first rank was situated near important water-powers. So long as water was cheaper than steam, power-using manufactures could be conducted more economically, even at the expense of isolation, in country places than in large towns. The fact that cheap coal made steam available in Philadelphia factories helps to explain why that was the only one of our older and larger cities to remain a textile center. No statistical measurement of the earlier ratio of urban to rural manufactures exists, but the census of 1860 credited New York City with 40 per cent of the product and 20 per cent of the establishments in that State, and Philadelphia with 46 per cent of the product and nearly 29 per cent of the establishments in Pennsylvania.[2] New England's manufactures were urban in a less degree, and Boston, though it founded many mills and factories elsewhere, did not receive them kindly within its limits.

Until after the middle of the century Cincinnati was the only inland city that attained a population of 100,000. Smaller places hardly presented urban conditions in the modern sense. Among the score or so of

[2] In 1810, according to the census, 36 per cent of the value of the manufactures produced in Pennsylvania was returned by Philadelphia. Including flour, this proportion rose to nearly one-half. In 1820, New York's reported manufacturing capital was $1,780,950, of which $300,000 was invested in engine works and foundries, $238,750 in sugar refining, and $185,000 in distilling and brewing; Dix, *Sketch of the Resources of the City of New York*, 44. Six years later, Cincinnati's manufacturing capital was ascertained to be $1,800,000; Hall, *Statistics of the West*, 269.

towns of minor size, ten or twelve were as noted for their industries as for their commerce. Some of these were of colonial origin and trading antecedents, like Providence, New Haven, and Newark; others, like Lowell, Manchester, Rochester, and Troy, owed their location, or at least their relative importance, to the natural facilities they afforded for manufacturing. Pittsburgh, though at this time it had less than 50,000 inhabitants, was the best example in the United States of an industrial city.

Town manufactures were diversified by the tendency to associate distinct but interdependent industries in one neighborhood, and by opportunity to use the labor of families but partially employed, from the nature of the occupations, in existing pursuits. At Philadelphia, Paterson, Lowell, Providence, and Worcester machine-shops were established in the first instance to build equipment for textile mills. But the surplus of male workers, where so many females were needed for spinning and weaving, favored the extension of these plants to make tools, locomotives, and general machinery. In western towns conditions were reversed, in that primary employments demanded men. These were engaged in slaughtering and packing stock, in grinding, brewing, or distilling grain, and in working iron and timber. Their wives and children, when forced to become wage earners, found employment in spinning mills, printing-houses, garment-shops, and minor trades that do not themselves assemble labor, but thrive on the labor attracted by more virile industries. The raw materials of the West, out of their abundance, and the scantier imported materials of New England, out of their husbanding, yielded by-products that likewise made a motive for new manufactures. Brush factories employing women and children were established at Cincinnati to utilize slaughter-house bristles. Packers also supplied materials for candles, soap, glue, and prussiate of potash, which latter was sent to dye works that had started up in New England subidiary to textile industries. From the same source came upholsterer's hair for western furniture factories. Massachusetts and Connecticut carpet-makers used grades of wool discarded by neighboring manufacturers of broadcloths and cassimeres. But no other locality or city presented those complex interrelations of coöperating skill, materials, and processes that characterize advanced communal industry in an equal degree with Philadelphia. At the Pennsylvania metropolis resided the largest population of hereditary operatives and artisans, with probably the highest average level of manual skill, in the United States. A description of the city's industries published in 1858 enumerated some 800 kinds of articles manufactured within its limits.[3]

[3] Freedley, *Philadelphia and Its Manufactures*, 469, Index. Some idea of the multiplication of industries during the previous 50 years may be obtained by comparing this with Mease, *The Picture of Philadelphia*, 74–76.

WOOD-USING MANUFACTURES

Primary manufactures grouped themselves in the vicinity of raw materials, while reproductive manufactures responded freely to other localizing influences. The previous allusion to the geography of forest industries calls for little amplification.[4] Early in the century there were no interior lumber markets, and the distribution and organization of this business was the same as in colonial times. With inland settlement New York and Pennsylvania produced more lumber than other States, holding this position until 1860, but their consumption exceeded their output. Maine, which was a large producer but a relatively small consumer, therefore remained the principal lumber-shipping region of the Union. During the first quarter of the century boards, like other country products, were sledded to points of water shipment while winter roads were good. Farmers brought several hundred sleigh-loads to Belfast in a single day. In 1825, when the Annawan Cotton Company proposed to erect a mill in Rhode Island, it sent its agent to Maine to buy materials.[5] By 1832 the annual output of the latter State was 38,000,000 feet.[6] Bangor was the greatest sawmill center in the country, having in its vicinity over 200 mills, with an estimated daily capacity of 1,500,000 feet.[7] The State's commercial product more than doubled during the following decade, and exceeded 200,000,000 feet by the middle of the century.[8] Most of this was used within New England, which had developed reproductive wood manufactures. About 1840 Boston began to draw upon Mobile for yellow pine, and ten years later commenced importing white pine by rail through Ogdensburg from the Great Lakes and St. Lawrence region.[8] Meanwhile New York's surplus product concentrated at Albany, which had become one of the greatest lumber markets of the country.[9] That city also received western pine through the Erie Canal. By 1860 over 110,000,000 feet of lumber annually entered Buffalo by water.[10] Following this to its source, Saginaw and Green Bay, during the middle decades of the century, began to rival Bangor as sawmill centers. During the ten years ending with 1857 Chicago's trade in lumber, exclusive of lath and shingles, rose from 32,000,000 feet to 460,000,000 feet.[11] This made that city the greatest mart in America, and all its lumber was from the Great Lakes pine belt. By 1853 Wisconsin was estimated to produce annually 200,000,000 feet of boards.[11] Before 1860 nearly 10,000,000 feet were sawed yearly at St. Anthony

[4] See 315–316, preceding.
[5] *Bagnall Papers*, III, 1937.
[6] *Hunt's Merchants' Magazine*, XVIII, 518, May 1848.
[7] *Niles' Register*, L, 378, Aug. 6, 1836.
[8] *Hunt's Merchants' Magazine*, XXVI, 246, Feb. 1852; XLV, 639, Dec. 1861.
[9] Albany had been a lumber market since the previous century; Smith, *Tour of Four Great Rivers*, 17; Hamilton, *Itinerarium*, 90.
[10] *Senate Ex. Doc.* 55, 38th Cong., 1st sess., 163; Walker, *Annual Statement of Trade and Commerce of Buffalo*, 1863.
[11] *Hunt's Merchants' Magazine*, XL, 229, Feb. 1859; XXIX, 629, Nov. 1853.

Falls, and upper Mississippi pine had displaced Allegheny pine from its long control of the St. Louis market.[12]

These were the principal districts making white-pine lumber for distant consumption. But the importance of neighborhood production is indicated by the fact that old States like Massachusetts and Connecticut doubled the value of their lumber output between 1850 and 1860, and that New York and Pennsylvania at the latter date reported more than one-fourth the sawmills and nearly one-fourth the product returned by the census for the whole United States.

Relatively to the North, the South did not become a large lumber-producing district. Yellow or hard pine was adapted to special uses and competed with white pine along the Atlantic seaboard. It added to the commerce of Baltimore, which between 1850 and 1860 rose to importance as a lumber market.[13] Wilmington and Mobile each shipped in the neighborhood of 18,000,000 feet annually, about one-half of which went abroad.[14] Virginia made cypress shingles, even raising the sunken timber of the Dismal Swamp for this purpose.[15] In 1834 Maine lumbermen found occupation in Georgia, and Savannah became the site of large wood-working establishments.[16] As early as 1800 thirty sawmills in Louisiana were cutting boards for sugar-boxes.[17] The manufacture of hardwood lumber was so closely associated with ship-building and reproductive industries as hardly to constitute an independent business. Sawmills were erected in California and Oregon before the American occupation, and in 1860 the former State ranked eighth among those of the Union in value of product, though probably not in volume.[18]

No figures exist that measure reliably the total growth of the lumber industry during this period. We can conclude with confidence from census data that the number of establishments decreased between 1840 and 1860, while the value of output multiplied several times. But as even at the latter date 20,000 sawmills and planing mills returned but $100,000,000 of gross product, or $5000 for each establishment it is evident that twenty years of centralization still left the industry much dispersed.[19]

From 1700 to 1860 the location of Atlantic ship-building changed very little, and vessels continued to be made chiefly of New England pine, oak, and maple,[20] and of southern live oak and cedar. About 1830

[12] *Hunt's Merchants' Magazine*, XXXVIII, 252; Aug. 1858; Fleischmann, *Erwerbzweige, Fabrikwesen und Handel der Vereinigten Staaten*, 244; Robinson, *Wealth of Minnesota*, 100.
[13] *Hunt's Merchants' Magazine*, XL, 229, Feb. 1859.
[14] King, *The Great South*, 472; *DeBow's Review*, XX, 354–355, Mar. 1856; XXVI, 81, Jan. 1859.
[15] Olmsted, *Seaboard Slave States*, 150. This was an old industry; Weld, *Travels*, 137.
[16] *Niles' Register*, XLVII, 55, Sept. 27, 1834; *Scientific American*, III, 206, Mar. 18, 1848; Campbell, *Business Directory of the South and West*, 327–328.
[17] *Cf.* Pantalba, *Mémoires*, III, 439.
[18] Hittell, *Commerce and Industries of the Pacific Coast*, 585, *et seq.*
[19] U. S. Census 1860, *Manufactures*, 738, items 330, 331.
[20] Bentley, *Diary*, IV, 495, Jan. 13, 1818.

New Bedford yards used northern and southern oak in equal quantities, and in 1845 Boston builders began to send men through the South to select, on the stump, live oak and hard pine for frames and sheathing.[21] About the latter date means were invented to bend futtocks and other irregular parts from straight timber, instead of ransacking forests for the eccentric shapes required.[22] As the size of vessels increased more iron was used in their construction. In 1853 a clipper ship of 4000 tons burden was on the stocks at Boston, in which iron braces were said to "extend from the floor heads to the top timbers, and form a perfect network of iron all over her frames fore and aft."[23] A few years later lower rigging, shrouds, stays, guys, and even topsail sheets not infrequently were of iron.[24] But the hulls of American sailing-vessels still were built of wood.

Steamships, partly to lessen fire risks and partly because they plied in waters likely to contain obstructions, made earlier trial of metal. In 1825 a sheet-iron steamboat was completed at York for service on the upper Susquehanna. It was a success, though on account of obstacles to navigation it was transferred from its original route to the Chesapeake.[25] Nine years later iron steamers or their parts were imported from England for a line between Savannah and Augusta.[26] Before 1840 a steamboat of the same material was built at New York for Louisiana owners, and one of over 300 tons was completed at Pittsburgh for the Ohio run.[27] A Buffalo yard launched the first iron steamer on the Great Lakes in 1862.[28] Before the Civil War iron-hulled ocean vessels with wooden upper works had some vogue, but they were topheavy and their timbers rotted rapidly wherever they were exposed to salt water in contact with iron.[29] Although a cautious transition to a new ship-building material was well under way, therefore, it did not occur with sufficient speed and assurance to affect the geography of that industry.

During the first years of the Republic, Philadelphia built more and better ships than any other port in America. The tonnage launched there in 1793 was about double the average amount forty years later.[30] Maine's timber resources soon gave it precedence in the construction

[21] McLane, *Report on Manufactures*, I, 182; *Hunt's Merchants' Magazine*, XLV, 639, Dec. 1861, quoting *Boston Commercial Bulletin*.

[22] Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1853, 24.

[23] Whitworth, *Special Report on New York Industrial Exhibition of 1853*, 24.

[24] *Boston Commercial Bulletin*, June 9, 1860.

[25] *Niles' Register*, XXVIII, 176, May 14, 1825; XXIX, 215, Dec. 3, 1825; Hazard, *Register of Pennsylvania*, XIV, 77, Aug. 2, 1834.

[26] *American Repertory*, I, 263–264, May 1840; Buckingham, *Slave States*, I, 170–171.

[27] *American Repertory*, I, 261, May 1840; Hazard, *United States Register*, I, 228, Oct. 2, 1839; *Niles' Register*, LVI, 416, Aug. 24, 1839; LVII, 300, Jan. 11, 1840; *cf.* also *Farmer and Mechanic*, I, 139, Mar. 18, 1847.

[28] Thomas, *Manufacturing Interests of Buffalo*, 1866, 57.

[29] *Boston Commercial Bulletin*, June 9, 1860.

[30] La Rochefaucault, *Travels through North America*, II, 373–374; Morse, *Geography* (ed. 1812), I, 425–426; Hazard, *Register of Pennsylvania*, XI, 46, Jan. 19, 1833.

of cheap sailing-vessels, and from 1830 to 1860 it built between a fourth and a third of all the shipping produced in the country. But though Maine still excelled in tonnage, after 1840 the value of its output fell below that of New York, and sometimes of Massachusetts or Pennsylvania.[31] Boston, though it brought its materials from a distance, maintained a leading position in this industry, and by 1860 was making iron steamers for South America.[32] During the prosperity of whaling many vessels were built for that service on Cape Cod and along the Sound. Towards the middle of the century New York passed Massachusetts, which hitherto had ranked second among the States, in tonnage, and took first place in value of output. The latter was due to the marine engines and high-grade work turned out at New York City. Many war-vessels, merchantmen, and river steamers were launched there for foreign owners.

Although Philadelphia lost its early rank as a ship-building center, that city and Baltimore continued to be famous for the quality as well as for the speed and shapeliness of their sailing-vessels. After 1840, when ironwork and machinery became increasingly important in ship construction, a tendency was manifest to restore the primacy of this industry to the Delaware Valley. Within twenty years the tonnage of Pennsylvania and Delaware increased fourfold, though that of the entire country only doubled, and in value of product Pennsylvania, passing Massachusetts soon after 1850, was by 1860 second only to New York.[33] Comparatively few vessels were built south of the Chesapeake, though in 1852 Louisiana, and about the same time Alabama, granted State bounties upon tonnage built within their borders.[34] The early ship-building enterprises of the upper Ohio continued intermittently, and war-vessels and merchantmen were launched from time to time at several points along the river. In 1848 a salt-water vessel of 300 tons was under construction at St. Louis, and the ship *Minnesota*, completed at Cincinnati, sailed for Liverpool.[35] Before 1840 a firm at Niagara was building ocean-going vessels, which were shipped, knocked down, via the Erie Canal, to be reassembled at Boston, and in 1860 ship-building for eastern account was described as a regular business at Cleveland.[36] Timber cost about one-third as much on Lake Erie as in Massachusetts. Small sailing-vessels for local traffic had been built upon the Lakes before the colonies were independent, and with the introduction of steam and the increase of settlement this business grew rapidly. In 1828 Buffalo had four steamers and one steam brig upon the stocks, with an aggregate burden of 1,100 tons;

[31] Computed from *Commerce and Navigation Reports* and *Census Reports*.
[32] *Boston Commercial Bulletin*, Mar. 31, 1860.
[33] Computed from *Commerce and Navigation Reports* and *Census Reports*.
[34] R. H. Edmonds in Southern Cotton Spinners' Association, *Proceedings*, 1900, 152.
[35] *Western Journal and Civilian*, I, 683–684, Dec. 1848.
[36] Buckingham, *America*, II, 541; *Hunt's Merchants' Magazine*, XLIII, 357, Sept. 1860.

twenty-five years later the same city launched over 16,000 tons of steam and sail shipping for fresh-water service.[37]

Various small craft, known as Durham boats, arks, Kentucky boats, keel-boats, and flats, according to the region and service in which they were employed, were almost as common a product of frontier industry as houses, barns, and wagons. Twenty years after the introduction of steamers 4,000 flatboats still descended the Mississippi annually.[38] Usually constructed for a single voyage and broken up for lumber at their destination, they were rudely made and gave rise to no special trades or subsidiary industries. But the building of river steamboats soon rivaled deep-sea ship-building, if not in volume at least in remoter industrial influence. It attracted skilled workmen to the West, employed large capital, encouraged local manufactures of cordage and naval stores, gave additional employment to sawmills, caused the erection of machine-shops and engine works along the western rivers, and disseminated a knowledge of mechanical arts and science where otherwise they would have been unknown. Between 1811 and 1835 more than 600 steamboats were launched upon the Ohio and its tributaries, and at Pittsburgh, Cincinnati, and Louisville the manufacture of these and their accessories was among the two or three leading industries.[39] By the middle of the century boats of 800 tons net burden plied our western waters, and the steam tonnage of the Mississippi Valley exceeded the entire steam tonnage of Great Britain.[40]

Relatively to the population, wealth, and industrial product of the country, our greatest period of ship-building activity was prior to 1807, when American yards annually built more than 110,000 tons.[41] This was not exceeded as an average for a series of years, until the decade ending with 1840. Thereafter tonnage increased faster than population, its period of greatest expansion beginning with 1850. During the subsequent decade the annual output of our shipyards exceeded 365,000 tons. According to the census the value of product was less in 1860 than in 1850, but this was an accident of figures. The returns for the latter date, based upon the business of 1859, chance to report a year of abnormal depression as compared with the average of the ten-year period. The high-water mark of this industry was during the years immediately preceding the panic of 1857, when our output for two successive seasons exceeded 500,000 tons.[42] Including vessels on

[37] *American Annual Register*, 1826–1827, II, 460; Buffalo, *Annual Statement of Trade and Commerce*, 1856, 26.

[38] Lippincott, *Manufactures in the Ohio Valley*, 109.

[39] Lippincott, *Unpublished Materials*, quoting *Western Journal and Civilian*, I, 393; *American Almanac*, 1832, 255.

[40] Hazard, *Register of Pennsylvania*, XI, 62, Jan. 26, 1832. The steam tonnage of Great Britain in 1850 was 104,680 tons; *Cyclopedia of Commerce*, II, 857. The steam tonnage of New Orleans district alone employed in domestic trade was 144,186 tons; *Commerce and Navigation Report*, 1850, Table 14-A, 9*.

[41] Seybert, *Statistical Annals*, 310.

[42] *Commerce and Navigation Report*, 1860, Table 25, 674.

inland waters, our country then had more than double the steam tonnage of Great Britain, and the total burden of our shipping in river, coasting, and foreign trade exceeded that of the mother country by more than 500,000 tons.[43] Ship-building then was one of our great industries. In 1850 it ranked twelfth in value of product, and it gave partial or full employment to many other branches of manufacture.

Establishments making cooperage stock and barrels, sash and doors, and framed houses, occupied narrower territorial limits than sawmills, and new inventions had more effect upon their organization and location. Sawmills had been run by power since the settlement of New England, while coopering and joinery remained exclusively hand trades for twenty years after the Constitution was adopted. Machinery for cutting and dressing staves was in operation at Cincinnati before 1815, and soon was so improved as to make a mill industry of their manufacture.[44] About 1830 machines for planing and matching flooring came into use, to be followed shortly by a practical mortising machine.[45] These mechanical aids centralized production in larger establishments than previously and localized it at convenient distributing points.

The use of imported woods caused the manufacture of fine furniture to cling to the seaboard. Like other small-shop trades of urban affinities, cabinet-making sought particular neighborhoods. About 1820 Greenwich Street, New York, was lined with little establishments of this kind.[46] Solid mahogany pieces, often excelling in design and quality modern factory productions, were made at Philadelphia, New York, and Boston; but the number of people able to enjoy such articles was comparatively small.[47] Part of the market of American makers was among the opulent and luxury-loving planters of the West Indies. Most common furniture was made by local carpenters. The manufacture of chairs, however, was specialized even before the Revolution, and was recognized as a distinct branch of furniture-making in the census of 1810. Rockers, said to be an American invention, became as popular among our Spanish-speaking neighbors as among ourselves. A single day's sailings from Baltimore, in 1827, carried 12,000 chairs of all descriptions to points around the Horn, besides an equal value of mahogany furniture.[48]

Steam-driven machinery began to be employed, more especially at

[43] *Cyclopedia of Commerce*, II, 857; *Commerce and Navigation Report*, 1860, Table 24, 670–671.

[44] Bishop, *History of Manufactures*, II, 176; Drake and Mansfield, *Cincinnati in 1826*, 52; *American State Papers, Finance*, IV, 76; *Niles' Register*, XXXVII, 178, Nov. 14, 1829; LII, 371, Aug. 12, 1837; *Hunt's Merchants' Magazine*, XVII, 321, Sept. 1847; XXXVII, 765, Dec. 1857, quoting *Scientific American;* Committee on the Machinery of the United States, *Report*, 66, in Great Britain, *Parliamentary Papers*, 1854–1855, L.

[45] See 421–422, preceding.

[46] Blowe, *View of the United States*, 395; Lambert, *Travels through Canada and the United States*, 77.

[47] *Cf.* Dyer, *Early American Craftsmen*, 55–75; Lyon, *Colonial Furniture of New England*, 179 and *passim*.

[48] *Niles' Register*, XXXIII, 156, Nov. 3, 1827.

Philadelphia factories, between 1815 and 1825. About the same time veneers were introduced. A mill for sawing the latter from mahogany was in operation at Newbury, Massachusetts, in 1831; but hand-sawing continued a decade longer.[49] The use of large-diameter circular saws made it possible to cut 16 veneers to an inch, where previously 4 had been the maximum.[50] Some large cabinet-shops were in existence before machinery was in general use. About 1816 one of these, at Baltimore, had a product of $100,000 annually;[51] but prior to 1840 most furniture was made to order, and warehouse and display-room stocks were rare. Machinery, in addition to changing the industry from a shop to a factory basis, increased its specialization. Plants were devoted to the manufacture of one or two articles of furniture, such as chairs, tables, or bedsteads, and even within this field they limited their operations to certain grades of work.[52] Power mechanism made this economical from an administrative standpoint, and the enlarged market that came with growing population and cheapened cost made it commercially possible.

Mechanical methods of production encouraged greater ornamentation and variety of design, but without adding to artistic merit. The positive benefit from this innovation lay in widening the consumption of common furniture rather than in improving the standard of better grades. The New York Convention of 1831 reported that the cost of manufacture recently had fallen 30 per cent.[53] In this industry, as in the case of textiles, machinery caused less substantial articles of rapidly changing style to be substituted for the lasting and long-used heirlooms of an earlier period. Instead of embodying the taste and character of an age, or the genius of a master artist, furniture now reflected the fancy of a passing fashion. But if seriousness of design suffered and individuality was lost in the flood of machine-made products, to the disadvantage of a few wealthy and cultivated purchasers, this was compensated by the benefit of even vulgar art to a multitude of consumers, for whom the incipient and factitious elegance of early factory goods represented the first step in household refinement.

From olden times Yankees delighted in the magnified whittling of the turning-lathe, and every form of wood-working found a congenial home in New England. Colonial Salem manufactured chairs and tables for export, and in 1831 half of the furniture it made was shipped abroad.[54] In some Massachusetts towns, like Ashburnham, Gardner, and Westminster, chair-making was a leading industry.[54] Between 1837 and 1855 the State's product of furniture and upholstery rose

[49] McLane, *Report on Manufactures*, I, 244.
[50] Freedley, *Philadelphia and Its Manufactures*, 272.
[51] *American State Papers, Finance*, IV, 128; *cf.* advertisement, *Maryland Journal*, Feb. 30, 1790.
[52] *E.g.*, Committee on the Machinery of the United States, *Report*, 13, 66–77, in Great Britain, *Parliamentary Papers*, 1854–1855, L.
[53] New York Convention of 1831, *Journal, Reports of Committees*, 128.
[54] McLane, *Report on Manufactures*, I, 250–251; 292–293, 492–493, 564–565.

from $1,300,000 to $5,800,000, and according to the census the Commonwealth ranked third in the Union in this industry in 1840 and 1850, and rose to second place ten years later.[55] However, New York outrivaled all competitors in value of cabinet wares. Until it yielded second rank to Massachusetts, just before the Civil War, Pennsylvania occupied a position next to New York in this industry. Ohio held fourth place. Cincinnati was the principal furniture-making center of the West, and was favored by the abundance of hardwoods tributary to its factories. In 1833 this industry ranked second only to machinery in that city. Large steam-plants, employing a hundred or more hands, had cheapened production until the Ohio metropolis commanded wide markets throughout the South and West.[56] About the middle of the century the output of these factories increased for a series of years at the rate of 25 per cent per annum.[57] St. Louis also had large establishments making ordinary chairs, beds, and tables, but in 1860 that city still received most of its common furniture from Cincinnati, and that of better quality from Philadelphia, New York, and Boston.[58] In fact, black walnut, then a favorite cabinet wood, was shipped from the Ohio Valley to eastern factories, from which it returned in the form of veneers and furniture to the region of its origin. According to the census, during the period immediately preceding the Civil War the number of establishments and of workmen employed in making furniture in the United Stated declined. But this was due to the centralization of plants and the larger use of machinery; for between 1840 and 1860 the value of furniture and upholstery annually manufactured in the country increased nearly fourfold, or from $7,000,000 to $28,000,000.

Early farm implements and vehicles were made largely of wood, and were built either on the farm itself or at village shops. Beginning with scythe-making, one branch after another of this manufacture became specialized, and subsequently centered in particular districts. Such a tendency already was under way in colonial times and was accelerated after independence by the growing complexity of agricultural tools and by the increasing subdivision of manufacturing processes. Ultimately separate factories were established for making hubs, felloes, spokes, or complete wheels, for helves and handles, and for axes, springs, and even cultivator-teeth or mower-knives. Village coachmakers became assemblers of fashioned parts instead of shapers and

[55] *State and Federal Census Reports.*

[56] Drake and Mansfield, *Cincinnati in 1826*, 56; Flint, *Letters from America*, 213; Cist, *Cincinnati Miscellany*, I, 187–188; *Hunt's Merchants' Magazine*, XXIII, 683, Dec. 1850; *Review of the Trade, Commerce and Manufactures of Cincinnati*, 1850, 9; Weld, *A Vacation Tour of the United States and Canada*, 201.

[57] *Annual Statement of the Trade and Commerce of Cincinnati*, 1855, 8; *cf. id.*, 1858, 16; 1860, 24.

[58] Missouri Republican, *Annual Review of the Trade and Commerce of St. Louis*, Jan. 10, 1854; Chase, *A Consideration of Some of the Commercial Wants of St. Louis.*

fitters of raw materials. The carriage-shops of Connecticut suggested our first separate works for making nuts and bolts, from which developed bolt-making machinery, standardized dimensions, and a new line of shelf hardware which local iron workers used in place of the earlier products of their own benches and anvils.[59] In the same way that carding and spinning mills prolonged home weaving, by relieving household cloth-makers of tedious or laborious processes, so early manufacturers of vehicle and implement parts assisted village craftsmen to meet the first competition of assembled factory products.

This, however, was but a passing phase of the transition to completer centralization of manufactures. That transition, common to all industry, was made even more inevitable in this instance by the substitution of agricultural machinery for farm implements and by its manufacture under patent rights. Nearly every improvement in agricultural aids from the day of Joseph Jenks has been legally protected. Patentees either manufactured their inventions themselves, or licensed large makers to do so, in preference to dealing with a scattered multitude of small mechanics. Finally, with the advent shortly before the Civil War of mowers and reapers, which derived much of their economy and utility from interchangeable parts, production in large works became a mechanical necessity. Every step towards this fuller integration of industry was also a step towards its more definite geographical distribution.

Even before independence southern New England made axes, scythes, and shovels beyond its own wants, and Philadelphia shipped pleasure vehicles to plantation customers. The latter were not numerous, as the bad roads did not invite to pleasure driving; but freight wagons on the plan of prairie schooners were common instruments of transportation. With the improvement of turnpikes early in the century came numerous stage-lines, calling for vehicles accommodated to their peculiar requirements. Builders at Troy and Concord originated coach designs of wide reputation. During the stage era the most usual private conveyance was the two-wheeled chaise, superseded before the middle of the century by the American buggy, which was a lighter, stronger, and more convenient vehicle for its peculiar service than Europe could offer.

Philadelphia already had 150 coachmakers when the Constitution was adopted, and the name of that city on a vehicle, as on a ship, continued to be regarded a guarantee of quality.[60] To the southward, Gettysburg and Baltimore, to the northward Newark, Albany, Troy, and such New England towns as New Haven, Amherst, Worcester, and Concord acquired more than local reputation as carriage-making cen-

[59] Wilbur, *History of the Bolt and Nut Industry of America.*

[60] Ebelings, *Erdbeschreibung von Amerika*, IV, 396; advertisement, *Impartial Review and Cumberland Repository*, Feb. 27, 1806.

ters;[61] yet until after the first quarter of the century the extent of this business at any particular point was but moderate. In 1831 the home of Concord coaches employed but 16 workmen at that industry, and its annual product was valued at less than $8,000.[62] The combined yearly output of the two principal carriage works at Worcester was probably under $30,000, including the value of repairs, and comprised less than 100 vehicles. In the largest of these establishments, then one of the principal manufacturing plants of the vicinity, but 15 hands were employed and no power machinery was in use.[63] Many vehicles were built under the "dicker" system, by which the wheelwrights, blacksmiths, body-makers, painters, and trimmers, who coöperated to make a coach or wagon, received for their labor a share in the completed article.

One of the earliest vehicle factories in America was established at Amherst in 1826. Within less than a decade these works used steam-driven machinery, employed 100 men, turned out carriages to the value of $100,000 annually, and shipped to Europe and South America.[64] As early as 1820 a considerable part of the vehicles made in Connecticut were exported.[65] Later, New Haven became the great carriage-making center of the country, and in 1860 the product of that city alone was valued at more than the entire output of any State except Connecticut, New York, and Pennsylvania. About half of the carriages of the country were made in these three States and New Jersey.[66] Pennsylvania manufactured the most wagons and had two very large factories—one reputed the largest in the world—engaged in this industry.[67] In the West, Ohio and Missouri were the leading makers of farm and freighting vehicles. California reported a more valuable output, but this was due to higher prices rather than volume of production.

AGRICULTURAL IMPLEMENTS

Immediately after the Revolution Americans manifested exceptional interest in labor-saving farm tools. George Washington imported an improved plow, which he had difficulty in getting repaired.[68] Thomas Jefferson experimented at Monticello with a locally invented seeding-drill, and owned a portable Scotch machine that threshed 150 bushels of grain a day.[69] Most of our early patents were for farm ma-

[61] Hazard, *Register of Pennsylvania*, II, 64, Jan. 24, 1829; VII, 96, Feb. 5, 1839; Blowe, *View of the United States*, 395; *Farmer and Mechanic*, I, 69, Feb. 4, 1847; *Hunt's Merchants' Magazine*, XXI, 57, July 1849.

[62] McLane, *Report on Manufactures*, I, 736.

[63] McLane, *Report on Manufactures*, I, 568–570.

[64] McLane, *Report on Manufactures*, I, 298; *Niles' Register*, XLV, 197, Nov. 23, 1833; XLVIII, 398, Aug. 8, 1835.

[65] *American State Papers, Finance*, IV, 52.

[66] U. S. Census 1860, *Manufactures*.

[67] Freedley, *Philadelphia and Its Manufactures*, 447–449; Bishop, *History of American Manufactures*, III, 59–63.

[68] Latrobe, *Journal*, 61; *cf.* also Washington, *Diary*, 72, Jan. 22, 1790.

[69] La Rochefaucault, *Travels through North America*, II, 73–74.

chinery. During Washington's presidency Sterling Furnace manufactured iron plows of three models, and measured their draft with test scales. The same works made portable winnowing-machines, one of which was sent to Mount Vernon.[70] It is not within our province to follow the development of farm machinery from this period to the Civil War. For many years almost every country furnace cast plow-irons, and the principal function of the cross-roads blacksmith was to make and repair his neighbors' implements of tillage. Throughout New England, northern New York, and Pennsylvania were scattered little establishments, mustering in their primitive equipment one or two forges and trip-hammers, that manufactured scythes, axes, and shovels for a general though territorially limited market. Some of these works ultimately developed into large enterprises; others disappeared when exposed to outside competition. New England and Pittsburgh makers early began to differentiate their product for particular customers. By 1812 hoes were made at Northbridge, Massachusetts, larger and heavier than were used in New England, for slaves upon cotton and sugar plantations.[71] Western makers received orders for small hoes of special design to be sold to the Indians.[72] Out of such diversified requirements, assisted by the economy of materials that Yankee thrift and dependence upon foreign iron and steel encouraged, new types of farm implements were evolved, notable for combining lightness and grace with strength. In their manufacture labor and processes were specialized and a standard of uniformity and finish established that precluded the successful competition of village mechanics or untrained manufacturers with the experienced and better-equipped implement-makers of New England. Indeed, many years later, when these articles were being sold abroad, even British makers admitted their inability to catch the knack of making farm tools in the American style, though a demand for them existed in their country.

Plow-making became a separate industry in Worcester County before 1830, when the combined output of three establishments, employing 10 hands in all, was about 1000 plows a year.[73] Pittsburgh probably led in this field of production. It had one steam plant, established in 1829, that soon developed a capacity of 100 plows a day.[74] These were sold to prairie farmers and down-river cotton-planters. With centralized manufacture, firms made their plow parts uniform, so that those broken could be replaced in the field without the expense and delay of resorting to a repair-shop. This, added to other economies of large production, drove village blacksmiths and small foundries out of the business. Precisely as American farm tools excelled those

[70] Crèvecœur, *Voyage dans la Haute Pensylvanie*, I, 283–284.
[71] *Bagnall Papers*, II, 1467.
[72] Christian Wilts, *Manuscript Letter Book*, July 24, 1814.
[73] McLane, *Report on Manufactures*, I, 556–559, 570–571.
[74] U. S. Census 1860, *Manufactures*, ccix.

of Europe in handiness, so did our plows excell all others in the lightness of draft and the ease of operation that costly labor and a system of extensive cultivation demanded in this country.

Threshing machines, for which American patents were issued before the beginning of the century, were made by general machine-shops until about 1840, when the great expansion of grain farming in the West created a new market for them. In 1844 Jerome I. Case, who previously had sold and operated eastern threshers in Wisconsin, laid the foundation, at Racine, of what eventually was to become the largest plant in the world for their manufacture. Cotton-gins were built at Philadelphia before Whitney made his great improvements, and in the North continued to be manufactured in connection with other agricultural or textile machinery.[75] In the South they were built at special plants, and this was the only branch of the implement industry that attained considerable proportions in that section before the Civil War. One of the largest pioneer establishments was at Clintonville, Georgia, and another at Prattville, Alabama; by the middle of the century each of these employed 100 hands or more, and the one at Prattville made 600 gins a year.[76]

In spite of several prior inventions, the problem of mowing grass and cutting grain by horse-power was not fully solved until after 1840, when a machine gradually developed by Cyrus McCormick, in Virginia, proved a practical success. That State was then a leading wheat producer, but its topography, labor conditions, and perhaps the conservatism of its farmers prevented its welcoming this improvement as cordially as did the prairie farmers of the West. The first reapers were built in Virginia, but in 1845, when their success was fully established, McCormick contracted for their manufacture at Cincinnati, and at Brockport, New York. These early agreements called for 400 machines the first season. In 1847 McCormick established his own plant in Chicago, the city which two years' previous experience showed to be most accessible to his principal market and also adjacent to the hardwoods which he largely used in his factory. Within three years these works produced annually 1600 machines.[77]

The nearly simultaneous establishment of the Case thresher works at Racine and the McCormick harvester works at Chicago illustrates the western movement then dominating all manufactures intimately related to grain-raising, though for another decade New York ranked first among the States, and Rensselaer and Cayuga ranked among the first four counties in the Union in value of farm machinery manufactured. But by 1860 Ohio and Illinois together produced more than

[75] Riley, *Development of Chicago as a Manufacturing Center*, 67; Freedley, *Philadelphia and Its Manufactures*, 430; Bishop, *History of American Manufactures*, III, 20.

[76] Mills, *Statistics of South Carolina*, 539–546; White, *Statistics of Georgia*, 355; *DeBow's Review*, IV, 136, Sept. 1847; XI, 102, July 1851; U. S. Census 1860, *Manufactures*, ccxvii.

[77] Andreas, *History of Chicago*, II, 684–685.

any other two States, and the West made almost half the entire product of the nation. Stark County, Ohio, with an output of harvesters and threshers approaching $1,000,000, and Cook County, Illinois, with a product worth over $500,000, were the greatest centers of this manufacture. In making farm implements such as spades, hoes, rakes, and forks, New England still retained its lead, and Massachusetts manufactured more of these articles than any other two States combined. Meanwhile, this entire group of industries demanded better engineering facilities as its products became mechanically more complex, and tended to center where metal-working trades were active and well established. Nevertheless this industry did not assume large proportions in eastern Pennsylvania and around New York City with their numerous machine-shops for heavy work. In the East it allied itself with the cutlery and small-casting group of iron manufactures, which was represented by the stove-foundries of the upper Hudson and the toolmakers of Worcester. In the West it localized primarily with respect to market outlets and raw materials and created its own industrial environment.

Census statistics relating to the manufacture of agricultural implements and vehicles were not gathered with even a pretense of completeness until 1850, and even then possessed but qualified value as absolute measurements of any dimension of this industry. All that we can infer with assurance is that between 1840 and 1860 the value of output rose rapidly, in the case of vehicles probably about doubling each decade and perhaps increasing threefold in case of agricultural machinery. By 1860 we made annually in round numbers $36,000,000 worth of carriages and wagons and $21,000,000 worth of farm machinery and tools.

MANUFACTURES USING FARM PRODUCTS AS RAW MATERIALS; DISTILLING PACKING, TOBACCO, SUGAR

Farming influenced manufactures not alone by market attractions, such as drew westward agricultural-machine works, but also by grouping tributary to itself the industries that used its products. Moreover, the inland migration of milling, distilling, brewing, and packing, that followed the transfer of grain-raising west of the Alleghenies, facilitated their geographical and technical centralization. The close correlation of these manufactures with agriculture classes them together despite the diversity of their products. This group of industries, like those depending on forest resources, developed spontaneously, without legislative support or other artificial aids, as a necessary outcome of the nation's productive activities. Its annals record no such competitive crises as afflicted textile factories and iron works, no complex interrelations with other industries or with commerce, and no distress due to changes in the processes and mechanism of manufacture.

In this uneventful history we may dismiss flour-milling with an allusion to the change in localization earlier described.[78] But during the half century two new conditions of importance appeared in liquor manufacturing—more whisky was made in proportion to rum, and more beer in proportion to spirits. American rum when unadulterated was distilled from molasses alone, and lacked the distinctive flavor given to its West Indian rival by the sugar-kettle skimmings used in its manufacture. It resembled grain spirits sufficiently in taste and appearance to be displaced easily by the latter. Whisky was made everywhere, as commonly as grain was ground, and was bartered with farmers—a gallon of whisky for a bushel of corn.[79] Molasses-distilling was localized around Massachusetts Bay and Newport Harbor, and along the lower Hudson, and its product was sold for cash. Habit extended a taste for whisky in proportion as the farming population multiplied, while tradition maintained a taste for rum only among the slowly increasing shore-folks and seafarers. Therefore, conditions of supply and consumption limited the growth of rum-distilling and fixed its location, while corresponding influences favored the wider distribution and larger production of whisky. The latter industry shifted its situation with the country's growth; while Massachusetts, which made more than three-fourths of our rum early in the century, continued to make half our product in 1850.[80] Grain-distilling responded to the same geographical attraction as flour-milling. In 1810 its chief seat was Pennsylvania, later New York, and after the middle of the century Ohio. By the latter date Cincinnati had become the largest whisky market in the world.[81] Western distilleries used corn principally, while those of the East employed more rye. The maximum capacity of a single plant rose from slightly over 100,000 gallons in 1810 to nearly 2,000,000 in 1850.[81] Though the census recorded less than one-tenth as many distilleries in 1860 as in 1810, the amount of spirits made had more than doubled. As a rule the States that produced the largest quantities of liquor manufactured it in relatively the fewest establishments. Contemporary testimony suggests that as the industry became less diffused, the consumption of spirits per capita declined, though a direct causal relation between these facts is not established.

During the early years of the Republic the use of malt liquors was advocated to check the excessive consumption of rum and whisky. This may have been a cause, and it certainly was an evidence, of a gradual change in drinking habits; for between 1810 and 1840 the product of breweries increased fourfold, while that of distilleries less

[78] *Cf.* 317–318, preceding.

[79] Howells, *Life in Ohio*, 125.

[80] *American State Papers, Finance*, II, 703; *cf. id.*, 14; DeBow, *Statistical View of the United States* (U. S. Census 1850, *Compendium*), 182.

[81] *Hunt's Merchants' Magazine*, XXXVI, 383, Mar. 1857; XVI, 93, Jan. 1847. A Louisville distillery in 1818 had a daily capacity of 1200 gallons; McMurtrie, *Sketches of Louisville*, 129.

than doubled. Until 1850, however, America manufactured more spirituous than fermented beverages, and it was not until ten years later that malt liquors gained the definite ascendancy they afterwards maintained. When the century opened Philadelphia was the principal manufacturer of ale and porter;[82] and from 1810 to 1815, according to census and revenue returns, Pennsylvania and New York held about equal rank in this industry. Together they made three-fourths of the country's product. Though beer was made in the Mississippi Valley before the region became American territory, until the Civil War the East maintained its hold on this industry. Albany was one of the big brewing centers of the country and had the largest plants in America.[83] When the Constitution was adopted many housewives still brewed small beer for their families, and for fifty years thereafter numerous village breweries continued in operation with an equipment and a volume of business hardly exceeding those of a country bakery. Until about 1840 ale was the principal malt beverage, and several of our larger brewers were British immigrants. Between 1840 and 1844 the manufacture of lager beer was begun at Philadelphia and probably in the West, where a brewing industry dating from the first years of the century, but checked by the dominance of distilling, was soon transformed and expanded through the influence of German immigrants. In 1857 Philadelphia manufactured 180,000 barrels of lager beer and but 170,000 barrels of ale, porter, and stout, showing the growing popularity of the newer beverage.[84] The largest plants now had a capacity approaching 200,000 barrels per annum. Steam was used for heating and sterilizing, as well as for driving pumps and elevators, and refrigeration made it possible to brew a uniform product throughout the year. America had not yet developed a distinctive brewing practice, as it did later, nor were processes understood and controlled as scientifically as subsequently; but technical as well as commercial conditions were already centralizing this manufacture and preparing the way for its transfer to the neighborhood of the grain and hop fields of the West.

In a larger view of industry during this period, wine-making, though undertaken with some success at a few places, may be omitted. Cider continued to be a popular beverage, but did not form the basis of a commercial manufacture. By the middle of the century rectifying whisky and distilling alcohol for industrial uses acquired importance. The latter was a principal constituent of the burning-fluids that before the introduction of petroleum had a brief era of popularity as illuminants.

Cattle and hogs continued to be raised as cheaply as in colonial

[82] Mease, *The Picture of Philadelphia*, 77–78.

[83] *Hunt's Merchants' Magazine*, XXI, 56, July 1849; Bishop, *History of American Manufactures*, III, 211.

[84] Freedley, *Philadelphia and Its Manufactures*, 195–197.

days so long as they had free range of unsettled country. But local consumers would pay no more for fresh meat than the cost of producing it. Upon frontier tables salt fish and bacon were considered luxuries compared with fresh steaks and venison. Meat could not be carried overseas on the hoof, yet foreign markets were necessary to make stock-raising profitable. In the eighteenth century there was no refrigeration, except as some New England farmers, late in the fall, killed a thousand pounds or so of fattened poultry which they packed in snow for winter marketing.[85] Canning was unknown, though oysters and lobsters were pickled in vinegar for export.[86] The only commercial processes of preserving meat were by salt-pickling, dry-salting, and smoking. Farmers and planters who stored and packed their own animals brought to market the excess not needed by their families. Merchants took live-stock in exchange for goods and had it killed and packed by men who made a specialty of this business. Some packers were themselves dealers in cattle and provisions, combining in their own hands both manufacturing and merchandising.

Robert Hewes, of Boston, in 1784 conducted a slaughterhouse, a salting-house, and a factory for glue, soap, candles, and starch; these were in separate but neighboring buildings. The owner also had a "shop" some distance from his "works," where he sold hard and soft soap, glue, neat's-foot oil, and watch lights, together with starch and hair powder. He purchased and killed live-stock for city merchants, and killed and sold for country clients. The capacity of his slaughter-house was 50 cattle and 200 hogs a day, and following a custom that continued for more than half a century later, and still persists in some countries, the fee for killing was the offals. Such works as these also repacked country salted meat for export.[87] In 1790 Jonathan Winship, of Little Cambridge, who was probably the largest packer in Massachusetts, put up 5000 barrels of beef for foreign markets.[88] New England fortunes were acquired through this industry, and Boston packers early in the century invested capital in the same business at Cincinnati.[89]

Packing remained dispersed in both organization and geography until its transfer to the West. During the early years of interior settlement, stock was driven over the mountains to eastern markets, or was slaughtered at the river-bank and the meat salted on flatboats that bore it down the Mississippi.[90] But when closer settlement curtailed free pasturage along driving-ways, and local facilities for curing and

[85] Bentley, *Diary*, II, 214, Feb. 13, 1797; *cf. Niles' Register*, XXX, 239, June 3, 1826.
[86] See 99, preceding; advertisement of Philip Lewis, in *Boston Newsletter*, Sept. 24, 1741.
[87] Advertisement, *Massachusetts Centinel*, Sept. 25, 1784; Nov. 2, 1785; June 28, 1786.
[88] *Columbian Centinel*, Dec. 1, 1790. Packing was an important industry near Boston for many years thereafter; *cf.* quotation from *New Hampshire Patriot*, in *Niles' Register*, XXIV, 262, June 23, 1823.
[89] *Bagnall Papers*, I, 156, 175; II, 1542.
[90] U. S. Census 1900, IX, *Manufactures*, III, 413.

carrying provisions improved, the industry centralized at inland markets. Packing was a specialized manufacture at Cincinnati before 1820, and grew into a business of importance during the following decade. This movement was stimulated by the extension of corn-planting in the Ohio Valley and of cotton-planting in the Southwest. Hogs were raised to utilize grain that otherwise had no market except for distilling, and bacon was cured to feed the pioneers and slaves engaged in subduing the rich bottom lands of the lower Mississippi. The small black cattle and lean, shaggy, mast-fed hogs of colonial and frontier days yielded inferior meat and little lard. Often the former was inadequately pickled or was dry-salted with poor salt. It was consumed by fishermen and seamen and by plantation slaves in the South and the West Indies. Even as late as the Crimean War the American salt meats shipped to the allies were tainted when they reached their destination.[91] But as corn-fed hogs and prairie-fattened cattle gradually replaced the inferior stock of the pioneers, better curing materials and processes were used and western provisions obtained a footing in more exacting markets. By the middle of the century Great Britain was importing tierce-packed beef from Chicago.[92]

Slaughtering and packing at first were done together, later were conducted separately, and finally again were combined at one establishment. At Cincinnati stock was killed outside the city, but was salted down and cured at storehouses in the business district; yet neither the butcher nor the packer, as a rule, dealt in the provisions he assisted to manufacture. The former took his fee in offals, as already mentioned, and packers were paid by the piece and the operation, at rates which sometimes were fixed by the chamber of commerce.[93] Both worked for owners, who were drovers and merchants dealing in live-stock and provisions on a large scale. For many years little change occurred in curing processes. In the West local salt was used, though it was considered somewhat inferior to the marine product. Both sugar-curing and refrigeration were suggested in the census report of 1810.[94] Before the middle of the century steam-rendering became general. Some houses packed only the hams and shoulders of hogs, using the remainder for lard and oil. For lard there was a ready market at Havana, and the demand for oil as a lubricant and as an illuminant was vastly increased by steamboats and railways.[95] The custom of covering hams and shoulders with canvas was introduced before 1850. By-products increased in value to such an extent that butchers paid a bonus for the offals in addition to their services. In 1847 one bristle-

[91] *DeBow's Review*, XXIII, 134, Aug. 1857.
[92] Riley, *Development of Chicago as a Manufacturing Center*, 59.
[93] *Niles' Register*, XLIX, 320, Jan. 11, 1840; *Cincinnati Price Current*, Nov. 1844.
[94] *American State Papers, Finance*, II, 686.
[95] Johnston, *Notes on North America*, I, 238; DeBow, *Industrial Resources of the United States*, I, 378.

dressing establishment at Cincinnati employed 100 hands. The packers of that city were enabled, by their facilities for using waste products, to pay from 7 to 10 cents a hog more than packers at other places.[96] The blood was used to make prussiate of potash, the hoofs for glue, and the fats for oils, candles, and soaps. Other refuse was manufactured into fertilizers.[97] Hogs were fed on distillery slops while awaiting slaughter.[98]

Three influences coöperated to centralize this industry. Until the introduction of refrigeration, after the Civil War, packing was confined to the colder months. Therefore it was conducted to best advantage in large towns, where butchers, salters, and coopers were numerous enough to afford a supply of seasonal labor. Live-stock was a cash commodity, and drovers and provision dealers required large sums of money at certain periods of the year, while at other times they employed comparatively little capital; therefore they could operate to advantage only where banking facilities were ample. In addition, the provision trade for the most part found its outlet in dispersed and distant markets and consequently required the commercial and shipping facilities which only cities afford.[99]

So long as the chief seat of western packing was in the Ohio Valley, hogs were the principal animals slaughtered; but beef-packing became important when settlements spread to the prairie States and railroads made western ranges tributary to the Great Lakes. In 1845 St. Louis packed 15 head of hogs for every head of beef it slaughtered.[100] Five years later Chicago packed more cattle than hogs,[101] and in 1853 that city shipped about the same amount of salt beef that Massachusetts exported in 1790.[102] Packing did not decline absolutely in the East, but it lost relative rank with the growth of western production.

Cincinnati, during the decade ending with 1850, packed about 27 per cent of the meat products of the West, but already Louisville, St. Louis, Chicago, and other western towns were prominent packing centers.[103] In 1850 Ohio packed nearly one-third, and together with Indiana packed one-half, of all the provisions manufactured in the country. The only eastern State with a production exceeding $1,000,000 was New York.[104] Ten years later Ohio, Illinois, and Kentucky were the three leading States in this industry. During this decade the number of packing-

[96] *Farmer and Mechanic*, I, 210, Apr. 29, 1847; *cf.* Smith, *Statement of Trade and Commerce of Cincinnati*, 1858.

[97] These economies were practiced at Boston in 1823; *Niles' Register*, XXIV, 262, June 28, 1823.

[98] This was a long-standing practice; *cf.* letter of Moses Brown to William Ellery, Nov. 29, 1791, in *Moses Brown Papers*, VII, 63; Krafft, *American Distiller*, 32; *cf.* McMurtrie, *Sketches of Louisville*, 129.

[99] U. S. Census 1900, IX, *Manufactures*, III, 413.

[100] Green, *St. Louis Directory*, 1845, xix.

[101] Andreas, *History of Chicago*, I, 563; U. S. Census 1900, IX, *Manufactures*, III, 414.

[102] *Columbian Centinel*, Dec. 1, 1790; *Hunt's Merchants' Magazine*, XL, 230, Feb. 1859.

[103] U. S. Census 1900, IX, *Manufactures*, III, 414.

[104] U. S. Census 1850, *Abstract of Manufactures*, in *Senate Ex. Doc.* 39, 35th Cong., 2d sess., 94.

houses reported by the census rose from 182 to 352, and the value of their product rose from $11,000,000 to over $30,000,000.

The art of preserving food by sterilizing with heat and inclosing in air-tight receptacles is said to have been discovered in France about 1795. Nearly fifty years before this, however, the Swedish traveler, Kalm, described a process used in New York to preserve oysters and lobsters. They were washed and boiled in one-half their liquor with vinegar and spices, and then put up in glass or earthen jars, "well stoppered to keep out the air." The sealing is described as an essential part of the process. Oysters were also packed fried in salted butter.[105] These oysters and lobsters were shipped in quantities to the West Indies and, as private correspondence of the period shows, were sent as delicacies by well-to-do New Yorkers to their friends and relatives in the interior of the colony.[106]

Soon after the close of the War of 1812 an Englishman who had learned the process of canning in his own country started the business in New York City. By this time the original method of preserving in glass jars had been modified by the use of cans. This New York firm soon advertised meats, gravies, and soups put up in tins, warranted to keep fresh for long periods, especially during protracted sea voyages.[107] Customers were informed that, if spoiled, the fact could be detected by the head of the can bulging. This preserving method was at first used principally for oysters, lobsters, and salmon. It was established gradually at several points along the coast and became an industry of some importance by 1840. About the latter year experiments in canning corn were begun at Baltimore and near Portland, Maine.[108] Vegetables of several varieties were canned in New Jersey in 1849 for Dr. Kane's Arctic expedition. The business received a great impetus about 1850 from the demand in California, where tinned meats and fruits, imported from the Atlantic States, were used so extensively as to be considered household necessities.[109] In 1860 the census reported that Maryland canned over $1,000,000 worth of oysters and that New York manufactured more than $750,000 worth of preserved fruits and pickles. What proportion of these now would be classed as canned goods is uncertain. The early records of this industry are scanty and do not record with certainty all phases of its development. Prior to 1860, however, this method of food preservation was confined chiefly to fish and oysters. Consequently it was localized near the coast and its principal center was Baltimore. No canneries were established in the West until after the Civil War.

[105] Kalm, *Travels into North America*, I, 185–187.
[106] Phillip Cuyler, *Manuscript Letter Book*, 1753–1760; Nov. 11, 1755; March 19, 1757.
[107] *E.g.*, advertisement, Daggett and Kensett, *New York Evening Post*, July 18, 1822.
[108] Maine, *Annual Report of Secretary of Board of Agriculture*, 1900, 198–199; U. S. Census 1900, IX, *Manufactures*, III, 480.
[109] *Hunt's Merchants' Magazine*, XXXI, 394, Sept. 1854.

Food preparation was the last of the household arts to be affected by specialization of labor, from which have resulted mechanical improvements, scientific processes, economical organization, and the other apparatus of highly developed industry. The flour mill, the bakery, the brewery, and the packing house, represent a place transfer of the activities for which they stand from households to central plants. They realize economy of production without creating new products. But another group of food manufactures expresses the reaction of specialized industry upon the products themselves. Early commercial food preparations were mostly for use on sea voyages. Salt provisions, strong beer, ship-bread, boating biscuit, and similar articles were made primarily for travelers. The household was assumed to supply itself. But when factories engaged in food production, the technical suggestions which their specialized operations offered and a desire for larger sales turned attention to new fields of consumption. However, only by invading the sphere of the household were wider markets obtainable. These markets demanded something better than the Spartan fare of old-time voyagers. Bakers of ship-bread, by their superior technique, evolved biscuits and that distinctively American product, crackers. Canning, which originally served only extraordinary demands for preserved food, created virtually new products by making the perishable aliments of all parts of the earth available for general use. Breakfast foods, unless we include among these oatmeal, cracked wheat, and pearl barley, were hardly known before the Civil War. Starch was made from potatoes or wheat, either in the household or at small mills, and until well into the century was used exclusively for hair powder and cosmetics, or to stiffen linen. Cotton manufactures increased the demand for this article, which was used for sizing and finishing cloth. Between 1840 and 1850 a New Jersey starch-maker discovered a process for employing corn, which was a cheaper material, in its manufacture. Stimulated by this success and aided by factory facilities, the same inventor soon afterwards gave the world a new food product in corn starch.[110] Since then the spontaneous impulse of an integrated and self-conscious industry to extend itself has added constantly to the extent and variety of the nation's dietary.

Tobacco cultivation influenced by its geography under cruder manufactures, such as leaf-stemming and making plugs. In volume and value of product these were the largest branches of this industry. They centered at Richmond, where shortly before the war 2,500 slaves were employed in some 40 tobacco houses,[111] and in the West at Louisville and St. Louis. In 1860 the largest establishment in the latter city

[110] Thomas Kingsford, in Depew, *One Hundred Years of American Commerce*, II, 457–458; *Hunt's Merchants' Magazine*, XXVIII, 253, Feb. 1853; Bishop, *History of American Manufactures*, III, 157–158; *cf.* advertisements, *Charleston Courier*, 1861, *passim*.

[111] *Hunt's Merchants' Magazine*, XX, 53, Jan. 1849; Edwards, *Gazetteer of Virginia*, 1854, 359; *cf.* Weld, *A Vacation Tour of the United States and Canada*, 313–314.

employed 500 hands manufacturing plug and fine-cut and preparing leaf for export.[112]

On the other hand, the distribution of snuff-making and cigar-making responded to commercial influences rather than to proximity to raw materials. The former manufacture already was a power-using mill industry before the Revolution. This fact affected somewhat its localization. Returns from the internal-revenue tax levied upon snuff in 1794, and later upon snuff mills, indicated that the amount at that time annually manufactured was about 80,000 pounds, and that three-fourths of this was made in Massachusetts. Doubt is cast upon the representative value of these figures by the small output of Pennsylvania, which reported a mill capacity equal to one-half that of Massachusetts, although it produced only one-fifteenth as much as New York State with still fewer mills.[113] However, at this time Albany had what was probably the largest tobacco factory in the country, employing 50 hands at spinning twist and making snuff, in a plant described by a French visitor as "truly grand and beautiful."[114]

Though cigars were used by the colonists, most tobacco at that time was smoked in pipes. A Baltimore firm, as early as 1786, manufactured fine-cut, which it put up in special packages with a trade label.[115] The Lorillards had begun business in New York about 1760, at a time when tobacco shops still were known as snuff houses.[116] Cigarettes were but little used before the hard times of 1873. Until the revenue law of 1861 increased the price of cigars, those made from domestic tobacco were wholesaled for $3 per 1000, and those made from West Indian tobacco for $9 per 1000. They were manufactured by women who earned 40 or 50 cents a day. In fact, with whisky costing 25 cents a gallon and two cigars retailing for 1 cent, the convivial indulgences of the early Republic were easily purchased. In 1809 a store at Shenandoah Furnace, Virginia, sold domestic cigars for 25 cents per 100, and Spanish cigars for 80 cents per 100.[117] During the high prices of the War of 1812, Pittsburgh merchants sold cigars for $2 per 1000 and whisky for 50 cents a gallon.[118] New Orleans cigars were advertised at Buffalo about this time.[119] According to the census of 1810, the Louisiana metropolis employed 400 cigar-makers; and Pennsylvania manufactured annually 29,000,000 "American" and 4,000,000 "Spanish" cigars.[120] That fragmentary enumeration ranked Maryland and Pennsylvania first among the States in value of tobacco products. The

[112] Scharf, *History of St. Louis*, II, 1247.
[113] *American State Papers, Finance*, I, 393, 394, 564.
[114] *Massachusetts Magazine*, III, 134, Feb. 1791; La Rochefaucault, *Travels through North America*, I, 372; *cf. American State Papers, Finance*, IV, 66.
[115] Advertisement, Valk and Burger, *Massachusetts Centinel*, Jan. 25, 1786.
[116] *Bagnall Papers*, I, 91.
[117] Shenandoah Furnace, *Manuscript Account Book*, July 8, 1809, to Jan. 6, 1810.
[118] R. and J. Patterson, *Manuscript Ledger*, 192.
[119] *Buffalo Gazette*, July 14, 1812.
[120] *American State Papers, Finance*, II, 707; IV, 163.

output of the entire country was estimated at $1,250,000. These figures shrank to $1,000,000 in the appraisements made for the internal-revenue tax of 1815, which probably did not report the true value of our tobacco manufactures.[121] More dependence may be placed upon the comparative tax at that time collected in different States, which indicated that Pennsylvania led in this industry, followed by New York, Virginia, and Maryland in the order named.

Cigar-making in the Connecticut Valley is said to have developed from a household into a shop industry about 1810. This is approximately the date when cigar factories started in Kentucky. During the second quarter of the century Essex County, Massachusetts, was an important cigar-making center. Probably this was on account of its commerce with Cuba and South America. In 1831 Newburyport, Saugus, and Salem made between 10,000,000 and 20,000,000 cigars annually and employed at this industry some 250 people, nearly all of whom were women. By 1837 the output of these three towns had nearly doubled.[122] Under the tariff of 1842 cigar-making prospered exceedingly in this vicinity, probably trebling in volume during the four years that law was in operation. New England had abandoned the manufacture of chewing tobacco to southern competitors, and snuff-making was on the decline. In 1846 one manufacturer at Newburyport employed 100 hands, of whom 90 were women, earning 40 cents in a ten-hour day. He made between 6,000,000 and 7,000,000 cigars annually. Cuban cigars cost $4 to $5 per 1000 to produce, of which one-half was the charge for manufacturing.[123] The tariff of 1846 was unfavorable to this industry, and cheap German cigars drove out of our market American cigars made from domestic tobacco, while Cuba supplied those of higher grades. Connecticut and Pennsylvania suffered especially from this change. Ultimately our makers specialized in medium-grade cigars made from imported fillers and American wrappers. This stimulated the raising of wrapper tobacco in the Northern States and Florida. Shortly before the Civil War the number of cigars annually made in the country was estimated to be between 300,000,000 and 400,000,000, and they constituted nearly one-third in value of all our tobacco manufactures.[124] Philadelphia was probably the leading city in this industry, though its largest factory had but 65 hands.[125] The gross value of tobacco manufactures reported by the census increased more than fivefold between 1840 and 1860, and at the latter date exceeded $30,000,000.

Mills for hulling and polishing rice and for making sugar were localized in their respective crop areas. The former engaged the otherwise

[121] *American State Papers, Finance*, III, 210.
[122] McLane, *Report on Manufactures*, I, 244, 247, 256; Massachusetts, *Statistical Tables of Industry*, 1837, 17, 18, 19.
[123] *Sen. Doc.* 72, 62d Cong., 1st sess., Part III, 1717.
[124] *Cyclopedia of Commerce*, II, 1851.
[125] Freedley, *Philadelphia and Its Manufactures*, 388–399.

dormant mechanical interests of the Carolina and Georgia lowlands, and employed the first steam-engines in that section. Maple-sugar was made extensively in the North, and when the revolt in Santo Domingo cut off part of our cane-sugar supply its production is said to have extended to relieve this deficiency.[126] A contract is mentioned in 1790 for 50,000 pounds at 10 cents a pound, which was the same price as West Indian sugar.[127] Along the upper Ohio "country manufactured sugar," as it was called, was an article of commerce and supplied practically the whole consumption of the frontier.[128] Several estimates make the annual product in that region and in parts of New York and New England about 15 pounds per capita.[129] According to the census of 1810 nearly 10,000,000 pounds were manufactured in the eight States that reported this article.[130] This equaled the amount of cane sugar made in Louisiana and the two together supplied a quarter of our consumption.[131] Forty years later the quantity of maple-sugar produced had more than trebled and it formed about the same proportion of the sugar used in the country as in 1810. But by this time the production of domestic cane sugar had risen to 237,000,000 pounds, or more than half of all the sugar we consumed.[132] Some experiments were made with beet-sugar between 1830 and 1840, but this industry was not established in America until after the Civil War.[133]

Early in the century cane cultivation was undertaken by all the Gulf States and by South Carolina; even North Carolina at one time hoped to raise this crop.[134] Wade Hampton proposed to substitute sugar entirely for cotton on his plantations, and in several South Carolina parishes sugar and sirup sufficient for local consumption were manufactured.[135] During the War of 1812 cane-sugar was made at several points along the Georgia coast, and in 1816 a consignment from this State reached New York;[136] however, no record occurs of an individual planter who made as much as 50 tons in a single season. Florida had

[126] Crèvecœur, *Voyage dans la Haute Pensylvanie*, I, 373.

[127] *Massachusetts Magazine*, II, 380, June 1790.

[128] *E.g.*, Hazard, *Register of Pennsylvania*, III, 10, Jan. 3, 1829; 138, Feb. 28, 1829; La Rochefaucault, *Travels through North America*, I, 126; O'Callaghan, *Documentary History of New York*, II, 671 (note); *Massachusetts Magazine*, III, 326, May 1791; 462, July 1791; James Weir, *Manuscript Letter Book*, I, 105; Thomas, *Travels*, 133.

[129] Morse, *Geography* (ed. 1812), I, 285; *Farmer and Mechanic*, II, 6, Jan. 6, 1848; *cf. Western Journal and Civilian*, IX, 194, Dec. 1852.

[130] *American State Papers, Finance*, II, 716.

[131] *American State Papers, Finance*, II, 808; Seybert, *Statistical Annals*, 258; *cf.* also *Niles' Register*, XX, 257, June 23, 1821.

[132] DeBow, *Statistical View of the United States* (U. S. Census 1850, *Compendium*), 174; *DeBow's Review*, XX, 97, Jan. 1856; *Commerce and Navigation Report*, 1850, 22, 24, 102, 104, 226.

[133] *Niles' Register*, L, 251, June 11, 1836; LVII, 16, Aug. 31, 1839; LVII, 384, Feb. 8, 1840.

[134] *Niles' Register*, XIII, 343, Jan. 17, 1818.

[135] *Niles' Register*, XXXVII, 209, Nov. 28, 1829; *DeBow's Review*, V, 183, Feb. 1848; *cf.* also *Niles' Register*, XII, 79, Mar. 29, 1817.

[136] *Niles' Register*, V, 113, Oct. 16, 1813; VIII, 152, Apr. 29, 1815; IX, 405, Feb. 10, 1816; IX, 452, Feb. 24, 1816; X, 431, Aug. 24, 1816; XXXVI, 162, May 9, 1829; XLI, 328, Dec. 31, 1831; *American Annual Register*, 1827–1828, III, 144; *House Doc.* 134, 21st Cong., 2d sess., 7.

small experimental plantations about 1825, and by the middle of the century made a crop of over 1300 tons.[137] Cane-planting also extended along the Gulf coast of Texas, where between 1850 and 1860 some 30 steam mills produced in favorable seasons about 4000 tons.[138]

Louisiana from the date of its acquisition has been our principal sugar-producing State. Cane had been raised near New Orleans almost half a century before sugar was made on a commercial scale, and the industry was less than a decade old when the territory was purchased by our government.[139] Its crop, which in 1810 was hardly 500 tons, more than trebled during the next ten years, and thereafter increased rapidly until 1854.[140] A depression occurred between 1835 and 1842, and between 1856 and 1860, due to low duties and a decline in sugar prices. At such seasons cane planters turned their attention to raising cotton. Steam was first used to grind cane in 1822, and within five years one-fourth of the plantations employed this power.[141] The remaining mills consisted of three perpendicular rollers cogged together and turned by horses. A battery of open pans was used for evaporating.[142] So long as these primitive processes prevailed, the industry remained much dispersed. In 1845 the average annual capacity of a Louisiana sugar house was under 100 tons. By this time, however, there were some mills that had cost more than $300,000, and had a capacity of 10 or 15 tons of sugar daily. The largest plantation in the State made a crop of 500 tons.[143] At the outbreak of the Civil War one-fourth of the sugar houses still used horse-power, and their average capacity still was about 100 tons.[144] During the previous twenty years important technical improvements had been adopted. Shortly after 1840 steam-heating and the vacuum-pan were introduced from abroad, and N. Rellieux, a native of Louisiana, invented the triple effect, one of the most important improvements in evaporating ever made.[145]

[137] *Niles' Register*, xxx, 241, June 3, 1826; xxxii, 89, Mar. 31, 1827; xliv, 194, May 25, 1833; xliv, 257, June 15, 1833; Harrisburg Convention, *Proceedings*, 67; DeBow, *Statistical View of the United States* (U. S. Census 1850, *Compendium*), 173.

[138] *Farmer and Mechanic*, i, 346, July 15, 1847; DeBow, *Industrial Resources*, iii, 284–285; Champomier, *Annual Statement of the Sugar Crop*, 1859–1860.

[139] *DeBow's Review*, i, 53–54, Jan. 1846; xxii, 618, June 1857; Stubbs, in *History of New Orleans*, 648; *cf.* Smythe, *Travels in North America*, ii, 30–32. There is an affidavit in the French Archives signed by several New Orleans merchants and officials, dated Dec. 16, 1761, stating that de Magan's sugar was "löyal et marchand en sa qualité de sucre brut et même supérieur à tous ceux que nous avons vus soit à Saint Domingue, La Martinique ou ailleurs," in Paris, *Archives Nationales, Colonies, f.* 3, 162.

[140] Hazard, *United States Register*, ii, 241, Apr. 15, 1840; Champomier, *Annual Statement of the Sugar Crop*, 1845, *et seq.*; *DeBow's Review*, xx, 97, Jan. 1856.

[141] Bishop, *History of American Manufactures*, ii, 275; Stubbs, in *History of New Orleans*, 648–649; Champomier, *Annual Statement of the Sugar Crop*, 1845–1846; *House Doc.* 134, 21st Cong., 2d sess., 6.

[142] Saxe-Weimar, *Reise durch Nord Amerika*, ii, 89.

[143] Champomier, *Annual Statement of the Sugar Crop*, 1845–1846; Buckingham, *Slave States* i, 338.

[144] Champomier, *Annual Statement of the Sugar Crop*, 1859–1860.

[145] A vacuum-pan said to have been used in 1830; Stubbs, in *History of New Orleans*, 668. For contemporary accounts of technical improvements, see *DeBow's Review*, ii, 330–344, Nov. 1846; iv, 383, Nov. 1847; v, 47–50, Jan. 1848; v, 249, Feb. 1848; v, 291–293, Mar. 1848; viii, 401–402 Apr. 1850; *Sen. Ex. Doc.* 50, 30th Cong., 1st sess., 251–253 (report of R. S. McCulloh); *cf.* also U. S. Patent Office, *Report*, 1847, 108–118.

About 1850 centrifugals were introduced for drying sugar.[146] By this time many plantations made white sugar at the mills, using boneblack filters to clear the juice. However, of 1308 sugar houses reported in 1860, only 49 as yet had any of these improvements. That year's crop was 131,000 tons. A large amount of molasses and rum was made, and the former was so rich in sugar as to supplement the latter in household consumption.

Louisiana's sugar mills helped to account for the refining industry at New Orleans. The pioneer establishment was in existence before 1810 and there were 3 refineries in the city in 1830.[147] What was supposed to be the largest in the world was erected there about this date. It employed 130 hands, refined 6,000 tons of sugar annually, and sold part of its product abroad.[148] Steamboats carried up the river about one-half of Louisiana's product, and refineries were in operation at Cincinnati in 1815, at Louisville in 1818, and later at St. Louis.[149] About the middle of the century New York drew ahead of Philadelphia, Baltimore, and Boston, its early competitors in this industry, and before 1860 refined more than half the sugar in the country. In 1856 the city was described as encircled by enormous refineries, some of which represented an investment of nearly $1,000,000.[150] It was then one of the leading sugar-markets of the world. This centralization was due in part to improvements in processes whch caused the concentration of refining in large plants requiring great capitals. During the early part of the century Europe had advanced rapidly in refining technique, while America had stood still. About 1833 our refineries began to use steam for melting and boneblack for clarifying.[151] Centrifugals, which previously had been used only for drying cloth at bleacheries and dye works, were adapted to separating sugar from molasses, by William Moller, a New York refiner, probably before 1845.[152]

These improvements in the machinery and processes used to extract sugar from the cane and to deprive it of its impurities, greatly cheapened the cost of production and assisted the remarkable extension of its use which then occurred. Between 1840 and 1860 the consumption of sugar in the United States increased two or three times as fast as the population, and by 1860 probably reached 30 pounds per capita or 40 pounds for each white inhabitant.[153] Meantime the proportion of

[146] *Bagnall Papers*, I, 108; *DeBow's Review*, X, 89, Jan. 1851; *Hunt's Merchants' Magazine*, XXXVII, 250, Aug. 1857. For their introduction on plantations, Stubbs, in *Standard History of New Orleans*, 669.

[147] *American State Papers, Finance*, II, 807; New York Convention of 1831, *Journal*, 66 (note).

[148] *New Orleans Advertiser*, Mar. 27, 1834, quoted in *Niles' Register*, XLVI, 174, May 10, 1834.

[149] Drake, *Statistical View of Cincinnati*, 1815, 143; Blowe, *View of the United States*, 521–522; Drake and Mansfield, *Cincinnati, in 1826*, 55; McMurtrie, *Sketches of Louisville*, 133; *Hunt's Merchants' Magazine*, III, 360, Oct. 1840; *Western Journal and Civilian*, I, 228–229, Apr. 1848.

[150] *Hunt's Merchants' Magazine*, XXXV, 501, 570–571, Oct. 1856.

[151] *Bagnall Papers*, I, 105–107; Hazard, *Register of Pennsylvania*, XIV, 178, Aug. 2, 1834.

[152] *Bagnall Papers*, I, 108.

[153] *Cyclopedia of Commerce*, II, 1772. In 1828, the per capita consumption was thought to be 12 pounds a year; *Banner of the Constitution*, I, 427, July 14, 1830.

refined sugar used on American tables rose from 1 pound in 10, before 1840, to 5 pounds in 10 in 1860.[154] Although more cane-sugar was made within the country than formerly, the growth of production by no means kept pace with the increase of demand. Imports, which before 1850 grew but moderately and sometimes were less than the domestic crop, doubled during the following decade. The effect of our increasing dependence upon foreign sugar was to centralize refining at the commercial metropolis of the country. The advantages possessed by New York as a distributing point further assisted this tendency.

ILLUMINANTS

In a very literal sense the nineteenth century constantly sought more light. The increasing spaciousness of buildings, the street-lighting requirements of growing cities, the new demands made by steamboats and railways with their all-night travel and signal systems, and the custom of operating factories long hours in order to utilize fully expensive plants and to meet the demands of seasonal trade, called for better and ampler illuminants. Until the discovery of mineral oil these were obtained chiefly from animals. The best were sperm oil and spermaceti. Chemists derived from fats a new product, stearin, which made more economical and better candles than the tallow which was its source. Through processes that gave stearin and oil among their resultants, lard became available for lighting. Pariffin and stearin compositions that made superior candles were also invented. When the latter were superseded by oil and gas, their manufacture had already developed into an extensive, mechanical, and relatively complex factory process. Complete statistics of this industry do not exist, as they were frequently combined with those of soap-making. We know that it was localized in factories in eastern Massachusetts early in the century, and that much spermaceti and Russian tallow were employed to make candles for export.[155] By the middle of the century Cincinnati was said to produce 2,500,000 pounds of star candles annually.[156] In 1860 "adamantine" candles to the value of $1,000,000 were made in the United States. But the passing importance of this manufacture, relatively to other industries, already was drawing to a close.[157]

The early colonists used lamps resembling in principle those of the ancients. Benjamin Franklin applied his inventive faculties with some success to their improvement. The argand burner and the glass chimney, brought from abroad, early increased the relative efficiency

[154] *American State Papers, Finance,* II, 426; Seybert, *Statistical Annals,* 258; *North American Review,* XLVIII, 428, Apr. 1839.

[155] La Rochefaucault, *Travels through North America,* I, 481; Bentley, *Diary,* II, 426, Apr. 19, 1802; *American State Papers, Finance,* II, 426; McLane, *Report on Manufactures,* I, 88–89. McMurtrie, *Sketches of Louisville,* 134, mentions a factory which in 1818 had a capacity of 3000 pounds of soap and candles daily.

[156] DeBow, *Industrial Resources,* I, 378.

[157] U. S. Census 1860, *Manufactures,* 734.

of lamps as compared with candles. This stimulated the search for better and more abundant illuminating fluids. Sperm and whale oil headed the list in quality. The former was employed by the government in lighthouses. Lard oil also was used extensively. Cincinnati alone made 1,200,000 gallons a year; and the "solar" lamp, patented in 1843 to use this oil, was probably the best lighting device at the disposal of American households before the introduction of petroleum.

Meanwhile attention was turned to vegetable sources for illuminants. Early in the century cottonseed oil was made experimentally at Philadelphia.[158] It was produced by processes resembling those employed since colonial times to make linseed oil. About 1825 it was manufactured commercially at Petersburg, Virginia, and elsewhere in the South.[159] This oil was sometimes used in lamps, and in 1835 the Council of New Orleans directed that it be employed to light the streets of that city.[160] Whether it ever was used for this purpose is doubtful, for its manufacture certainly did not attain large proportions until shortly before 1860. The value annually produced then exceeded $750,000.[161] Between 1830 and 1850 the farmers of Illinois raised castor beans in quantities sufficient to support several oil mills. The product was burned in lamps.[162] Later this manufacture centered at St. Louis and the oil was used more largely for medicinal purposes.[163] Corn oil, which was a by-product of distilling, was employed for lighting by settlers around the Great Lakes.[164] Rosin and turpentine were distilled for camphene, which was manufactured in the North and at Mobile.[165] This either was burned alone, or was combined with alcohol in the proportion of 1 to 5, to make an illuminant called spirit gas or burning fluid. Before the war about 1,100,000 gallons were manufactured annually at Philadelphia and perhaps half this quantity at Cincinnati. A peculiar lamp was required for its use, and it was dangerously explosive, but it was widely employed, notwithstanding these disadvantages.[166]

Mineral oil was known as a casual product of natural springs and salt-wells long before it was obtained from wells drilled especially for that purpose. The latter date from 1859. Soon after 1825 petroleum, gathered from spontaneous sources, was used as a lubricant and to light

[158] *Niles' Register*, XXXVII, 96, Oct. 3, 1829; *cf. ibid.*, XIX, 143, Oct. 28, 1820.

[159] *Niles' Register*, XXXVII, 3, Aug. 29, 1829; XXXVII, 96, Oct. 3, 1829; LXIV, 222, June 1, 1833; XLV, 30, Sept. 7, 1833; XLV, 40, Sept. 14, 1833; XLVII, 198, Nov. 29, 1834; XLVIII, 186, May 16, 1835; *DeBow's Review*, XIX, 601, Nov. 1855. Governor Williams in a letter to Col. Chestnut, Oct. 17, 1830, mentions an anticipated output of 4000 gallons from a coming run.

[160] *Niles' Register*, XLVIII, 186, May 16, 1835; *DeBow's Review*, XVI, 204–205, Feb. 1854; XXI, 162, Aug. 1856; *Hunt's Merchants' Magazine*, XXXVI, 386, Mar. 1857; Lamborn, *Cottonseed Products*, 18–19.

[161] U. S. Census, 1860, *Manufactures*, 739.

[162] *Illinois in 1837*, 59; *Niles' Register*, LX, 400, Aug. 21, 1841.

[163] *Hunt's Merchants' Magazine*, XXXV, 366, Sept. 1856.

[164] Hazard, *United States Register*, II, 111, Feb. 5, 1840; V, 352, Dec. 1, 1841; Johnston, *Notes on North America*, I, 153.

[165] *DeBow's Review*, XXIII, 484, Nov. 1857; XXV, 583, Nov. 1858.

[166] Freedley, *Philadelphia and Its Manufactures*, 146–148; *Statement of Trade and Commerce of Cincinnati*, 1859, 15.

workshops and factories.[167] A well struck in Cumberland County, Kentucky, in 1829, while boring for salt, was described as a small gusher throwing out 75 gallons a minute.[168] The first regular supply, however, was distilled from shale and coal. Several plants were erected for this purpose. In 1857 one company tendered 95,000 gallons of mineral illuminating oil to the Lighthouse Board.[169] This distilled oil was called kerosene, as distinct from coal oil or petroleum, and in 1860 it was manufactured to the value of $2,100,000.[170] Lamps were already perfected for burning it.[171] But oils of mineral origin, though produced in very large quantities compared with other illuminants, did not materially lessen the production of the latter for lighting until after 1865. By this time the demand for animal oil for lubricating and other industrial uses was so great that its production was not decreased, though the field of its principal employment was changed.

It illustrates the urgency with which modern industry calls for superior light that the first commercial use in this country of both gas and petroleum was in factories. During the War of 1812 coal-gas was used to light cotton mills at Watertown and Providence.[172] It was employed for street-lighting at Boston in 1822, and a few years later at New York, Brooklyn, Philadelphia, Baltimore, New Orleans, Cincinnati, and several smaller cities. Some companies used rosin and oil for gas-making until the middle of the century, and rosin and coal-tar were employed by private plants at factories.[173] Natural gas was discovered at Fredonia, New York, about 1825, and was used to light several buildings in that village.[174] Five years later it was employed at Portland Harbor Lighthouse, on Lake Erie, and subsequently in private houses at Lockport, and in St. Clair County, Michigan.[175] By 1860 the value of gas manufactured in the United States was $12,000,000, or about as much as that of petroleum, kerosene, and whale oil combined.

Whale oil came largely from Cape Cod and its vicinity. Otherwise the manufacture of animal products for lighting centered in cities, near consumers and labor. Most country people still used home-made candles, and outside of cities and towns the demand for industrial and community lighting was negligible.

A similar indifference to domestic sources of raw materials governed

[167] *Cf.* Hildreth, "Observations on the Saliferous Rock Formation in the Valley of the Ohio," in *The American Journal of Science and Arts*, XXIV, 64, July 1833, and Ohio, *First Annual Report of the Geological Survey*, 1838, 62–63.

[168] *Niles' Register*, XXXVI, 117, Apr. 18, 1829; *American Annual Register*, 1825–1826, I, 328, 155; John A. Bownocker, "Petroleum and Natural Gas in Ohio," in Ohio, *Report of the State Geological Survey*, Ser. IV, *Bulletin* I, 31.

[169] *Hunt's Merchants' Magazine*, XXXVI, 385–386, Mar. 1857.

[170] U. S. Census 1860, *Manufactures*, 739; Alderson, *Oil Shale Industry*, 38–39.

[171] United States International Exhibition of 1876, *General Report, Judges' Group* III, 145–146.

[172] *American Wool and Cotton Reporter*, XIV, 368.

[173] *Textile World*, XXII, Feb. 1902.

[174] *American Annual Register*, 1825–1826, I, 328.

[175] *Niles' Register*, XXXVIII, 403, July 31, 1830; XLVIII, 451, Aug. 29, 1835; LX, 240, June 12, 1841.

the geography of leather manufactures. Tanning was so widely dispersed that in 1860 it ranked fifth among our industries in number of establishments. The latter were scattered through all parts of the country. Those of New England and the Middle States used many imported hides and averaged three times the capacity of tanneries situated in the South and West. Although fairly large plants, under corporate ownership and using mechanical improvements, were in existence early in the century, and numerous patents for leather-making processes and machinery were issued, no radical change occurred in tanning before the Civil War. Our most important leather-using manufacture was that of boots and shoes, the localization and progress of which have already been described.[176] Harness and saddle making remained a shop occupation.

The salient fact regarding leather manufactures was their quantitative importance. In value of output boot and shoe making ranked fifth among our manufacturing industries; and if we disregard duplications common to all such statistics, caused by the appearance of the products of one branch of industry as the raw materials of another, leather and leather articles were exceeded in value only by flour and by unmanufactured and manufactured iron.

Most of the manufactures so far reviewed served the necessary function of utilizing basic resources. They were intermediate or ultimate steps in primary production. The gross value of their product was large because it repeated in the item of raw materials the nation's cash income from forestry and agriculture. Only a minor fraction of that value represented the output of machinery and operative labor. These industries, as a rule, did not encounter foreign competition or derive their prosperity from tariffs.

There remains another group of manufactures, more distinctively reproductive and not so intimately related to the activities of the field and forest. These did not hold so assured a position in our national economy. Among them were nearly all of our great protected industries; and ranking first in importance were the manufacturing of iron and of textiles.

[176] See 443–445, preceding. The value manufactured in New England with Boston capital rose from $14,000,000, in 1837, to $50,000,000 twenty years later. The old system of selling through distant agencies and on consignment had been abolished, and Boston had become the great boot and shoe market of the Union; Boston Board of Trade, *Report on the Branch House System*, 6, 7, 8.

CHAPTER XIX

MANUFACTURE OF METALS

Iron smelting and refining, 496. Foundry industries, 502. Engine and locomotive works, 505. Rolling mills, 510. Machine-shops, 515. Tools and hardware, 521. Copper and brass, 525. Jewelry and silverware, 527.

IRON SMELTING AND REFINING

No single thing better measures the industrial standing of a nation than its use of metal. Shelter, food, and clothing are products of all stages of society, and the extent to which these are consumed does not vary widely between countries of relatively primitive and of advanced development. Ancient and modern Rome might use approximately the same amount of bread and wine, of linen and woolen cloth, and of house room in proportion to their population; but we can hardly conceive of their using the same amount of iron and steel. Could we compare some center of ancient industry with a modern manufacturing town the contrast would be still more striking. Yet this disparity in the use of metals is largely the result of one century's progress; and in no country, unless it be Great Britain, has the change been greater or more obvious than in the United States.

During the half century ending with 1860 our per capita consumption of iron probably increased fivefold, and by the latter date approached 120 pounds per annum. Most of this was smelted and manufactured into finished forms within the country, and in value of product this industry exceeded any other except flour-milling.

Iron was made before the close of the Revolution in all the thirteen colonies except Georgia, and was also made in Maine and Vermont.[1] Between this date and the opening of the Civil War smelting furnaces or forges were at some time in operation in every State east of the Mississippi except Florida, Mississippi, and Louisiana, and also in Missouri, Arkansas, and Texas. Notwithstanding this wide geographical extension, however, important primary iron manufactures were grouped in well-defined districts. By 1860 the smelting of bog ores had practically ceased. The furnaces of eastern Massachusetts, Rhode Island, and eastern Connecticut, though they prolonged operations by importing ores from New Jersey and Pennsylvania, gradually withdrew from primary production between 1825 and 1840.[2] Probably the last furnace in southern and eastern New Jersey using these ores went out of blast in 1854.[3] The furnaces of that State in turn had imported ores from Delaware as local supplies grew less. A furnace and a few forges in Delaware itself ceased operation about the middle of the century.[4] The only

[1] See Plate 2, 498. In 1810, the largest iron works in the Northern States were in Vermont; Bruce, *Mineralogical Journal*, I, 80–83.

[2] Swank, *Iron in All Ages*, 126; Bentley, *Diary*, II, 180, Apr. 20, 1796; Massachusetts Historical Society, *Collections*, IX, 256; McLane, *Report on Manufactures*, I, 192; History of Coventry Forge, in *Providence Daily Journal*, Feb. 1, 1859.

[3] Lee, *New Jersey as Colony and State*, III, 252.

[4] McLane, *Report on Manufactures*, II, 777; Lesley, *Iron Manufacturer's Guide*, 62.

important bog-ore district outside these coastal regions was in northeastern Ohio, on the south shore of Lake Erie, where an active furnace industry was founded before 1825 and continued prosperous until the exhaustion of timber and minerals caused its decline.[5] A single small furnace was making pigs in this district when the census of 1860 was taken.

Before the Revolution furnaces and forges had been erected all along the belt of rich magnetic and brown hematite ores extending from Rutland County, Vermont, through the Berkshires in Massachusetts and the Salisbury district in Connecticut, across the Hudson through Orange County, New York, and into Morris County, New Jersey. This region did not decline in absolute importance during the period before 1860, though it lost rank relatively to newer fields of production in Pennsylvania and the West. It supported all the important enterprises of New England after the exhaustion of coastal ores. Neither New Hampshire nor Maine ever continued at one time more than a single active furnace, and these, together with a few bloomery forges, contributed inappreciably to the nation's output. Shortly after 1800 New York developed an important iron region in the vicinity of Lake Champlain, where rich magnetic ores were reduced in bloomeries of a special type which later used the hot blast. On account of their high quality, Champlain and Salisbury iron held their own in the domestic market, in spite of being from producing centers within the area of maximum foreign competition. Champlain iron was adapted to making the low-grade steel used for agricultural implements and for cheap tools and cutlery.

In Pennsylvania iron-making had extended well up the Schuylkill and Susquehanna Valleys and even into the Juniata Valley before the end of the eighteenth century. Furnaces also had been erected tributary to Pittsburgh, in the western part of the State. It was nearly 1810 before the iron industry was established in the Lehigh Valley.[6] Maryland continued to make iron in the districts where colonial furnaces or forges had existed, and during the first quarter of the century gradually extended these works through the northern counties in a district geologically identical with the southern Pennsylvania iron region. Between the close of the Revolution and the War of 1812 numerous forges and a few furnaces were built along the slopes of the Blue Ridge and Allegheny Mountains, in southwestern Virginia and the western Carolinas.[7] During the first decade of the Republic iron works were erected also in eastern and middle Tennessee and Kentucky. It was not until 1810 or later that forges or furnaces were in operation in Georgia and Alabama. Some bloomeries in the latter State used a hot blast. Bloomeries and furnaces were in operation west of the

[5] Whittlesley, *History of the Coal and Iron Business of Cleveland; Niles' Register*, XXXIII, 210, Dec. 1, 1827; Swank, *Iron in All Ages*, 302. Bog ores were smelted also in southern Michigan and elsewhere, but only temporarily and for local uses; Swank, *Iron in All Ages*, 320.

[6] Swank, *Iron in All Ages*, 191, 204, 214.

[7] *Cf.* Michaux, *Travels to the Westward of the Alleghany Mountains*, 338.

Mississippi, particularly in the vicinity of Pilot Knob and Iron Mountain, Missouri, before 1825, and about 1840 a furnace was erected in Texas.[8] In the immediate vicinity of the Ohio River the Hanging Rock iron district of Kentucky was developed between 1818 and 1850. A continuation of this district in Ohio, from the vicinity of the Portsmouth north to the Hocking Valley, soon afterwards was the site of several successful furnaces. The first iron in that State was made in the Mahoning Valley, a region that is still a principal seat of this industry.[9] Between 1846 and 1860 Lake Superior ores were smelted in the northern peninsula of Michigan and at furnaces near Detroit and in northern Ohio.[9] These ores, as previously noted, also gave rise to the first primary iron manufactures of Buffalo.[10] Small furnaces to supply local consumption were erected at a few points in Indiana, Illinois, and Wisconsin, but these States were not considerable producers of iron.

The distribution of the industry was affected radically by the introduction of mineral fuel, which led to a great revival of iron manufacturing east of the Alleghenies, especially in Pennsylvania.[11] Coal brought by canals also gave new life to the furnaces of northern New Jersey and the Hudson Valley. Meanwhile, however, south of the Potomac, the smelting of charcoal iron declined and the primitive iron industry of the southern Appalachians began gradually to disappear. The great field of iron manufacturing in the South, from Chattanooga to Birmingham, was not yet developed, nor were its resources even explored. Facilities for assembling ore from Lake Superior and fuel from Pennsylvania were still limited and had not determined the distribution and extent of primary iron manufactures in the North.

In 1860 the ten principal iron regions of the country were northern New York, including Vermont, where the primitive ores of the Adirondacks were reduced by 40 bloomeries and several furnaces into high-grade iron; the highland belt from the Berkshires to Pennsylvania,

[8] Swank, *Iron in All Ages*, 332, 338; *Hunt's Merchants' Magazine*, XIX, 452, Oct. 1848; Texas, *State Geological Survey, 2d Annual Report* (E. T. Dumble), 8.

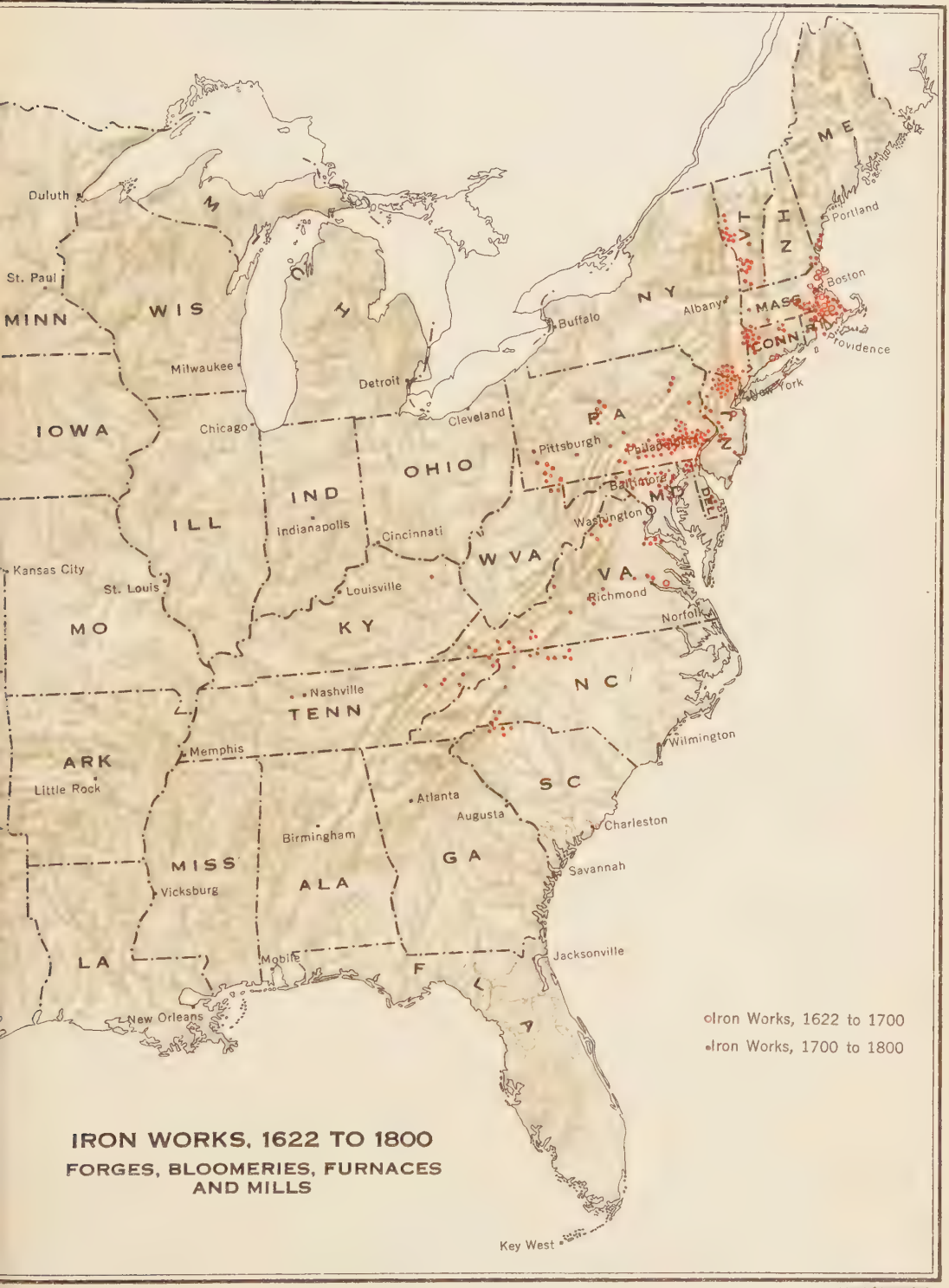
[9] Swank, *Iron in All Ages*, 301, 321–323; Swineford, *History of Lake Superior Iron District*, 74–89; *Western Journal and Civilian*, XII, 59, Apr. 1854; Talcott, *The Manufacture of Pig Iron*, in American Society Civil Engineers, *Transactions*, I, 193; *Hunt's Merchants' Magazine*, XXXVII, 767, Dec. 1857; *DeBow's Review*, XXIV, 464, May 1858.

[10] See 353, preceding.

[11] Iron and Coal Trade Committee, *Letter against Repeal of Duty upon Railway Iron*, 10–12.

IRON WORKS, 1622 TO 1800

Plate 2 shows the location of the forges, bloomeries, furnaces, and mills engaged in iron-making in the English Colonies at some time during the seventeenth and eighteenth centuries. It is based mainly on data from Bishop's *History of Manufactures*, and Swank's *Iron in All Ages*, and from the reports and articles by the latter author in the Census of Manufactures of 1880 and in *Mineral Resources of the United States* for 1886 and 1900. The map does not show the location of all the iron works of this period, as records of some have no doubt been permanently lost, and information regarding others may come to light in the future. In a few instances the existence of works is known, but not their location, and their position could not be shown. In other cases iron works are reported to have been on a certain stream, or in a certain county; if the stream is short or the county small the location has been indicated, otherwise it has been omitted. In a very few counties all the works can not be shown for lack of space. It is believed, however, that every important iron-working region of the period is adequately represented.



IRON WORKS, 1622 TO 1800

FORGES, BLOOMERIES, FURNACES AND MILLS

ALBION COLLEGE
LIBRARY

including the old Litchfield, Orange, and Morris County districts, where 44 charcoal and 22 anthracite furnaces and 60 bloomeries used hematite and magnetic ores; eastern Pennsylvania and northeastern Maryland, with 98 anthracite furnaces and 103 charcoal furnaces employing similar ores; northwestern Virginia and southwestern Pennsylvania, where 42 charcoal furnaces and several forges smelted carbonate northwestern Pennsylvania and northeastern Ohio, including the Mahoning district, with 66 furnaces, where coke and soft coal were being substituted for charcoal to make pigs for Pittsburgh forges and rolling mills; the Hanging Rock region athwart the Ohio, where 17 furnaces in Kentucky and 45 in the State of Ohio used local coal in connection with charcoal to smelt ores from the Coal Measures; the old iron region of middle and eastern Virginia, with 31 active furnaces and 35 bloomeries; northeastern Tennessee and northwestern North Carolina, with 9 furnaces and 41 bloomeries in a compact area near the Cumberland Mountains; the district in western Tennessee and Kentucky near Clarksville, which contained some 45 furnaces and forges; and finally the Iron Mountain region of Missouri, where 7 furnaces were manufacturing pigs with coal from western Missouri and Kansas.[12]

At this time eight river valleys with their tributaries supplied most of our domestic iron. The Housatonic produced annually 25,000 tons of pigs, which were remelted in the vicinity for railway wheels and malleable castings. The Hudson, where anthracite was used to smelt the rich Champlain and Berkshire ores, had increased its output to 75,000 tons. The Delaware and Lehigh Valleys were the home of some of the largest iron works in the Union and produced over 160,000 tons a year. In the neighboring Schuylkill region, where furnaces were somewhat smaller, the total output was 100,000 tons. Farther south and west the Susquehanna excelled slightly the Delaware and Lehigh Valleys in the extent of its production. The country tributary to the Potomac, where charcoal was still used for fuel and production was declining, smelted annually 40,000 tons of pigs, of which three-fourths came from Maryland. West of the Alleghenies the great Ohio Valley, with its tributaries, the Cumberland and Tennessee, produced 400,000 tons per annum.[13] The time was at hand when the center of furnace output would shift from the Atlantic slope to what but a few years before had been regarded as the western country.

This development had been achieved in the course of sixty years of varied prosperity, during which, in spite of periodical checks and occasional longer depressions, progress had been fairly continuous. American iron-masters were prosperous between 1789 and 1800. Furnaces and forges that had ceased operation and fallen into disrepair during

[12] American Iron Association, *Bulletin*, 1858, 168; also in *Hunt's Merchants' Magazine*, XXXVIII, 634, May 1858; *DeBow's Review*, XXIV, 463, May 1858; Lesley, *Iron Manufacturer's Guide*, 748–749. See Plate 3, 504, *f*.

[13] *Western Journal and Civilian*, XIII, 332–334, Apr. 1855.

the Revolution and the succeeding depression were reëstablished, and new ones were erected.[14] In 1791 Alexander Hamilton reported: "Iron works have greatly increased in the United States and are prosecuted with much more advantage than formerly."[15] Hamilton did not refer specifically to ore-smelting, but his statement applied to this indusry as appropriately as to those reproductive manufactures with which his report was more particularly concerned. The census of 1810 enumerated 153 furnaces, producing 53,908 tons of iron, but as 32 of these were air-furnaces, used to remelt pigs for castings, this output probably included duplications. In addition, 153 bloomeries were reported, 86 of which produced 2,564 tons. In value of product, especially of furnace iron, Pennsylvania led all the States and manufactured nearly 50 per cent of the nation's output. New York followed Pennsylvania; New Jersey occupied third place, and Maryland fourth.[15] If the tax collected upon iron and certain of its manufactures under the revenue law of 1815 measures their true volume, the industry was less active at this date than five years previously.[16] Other evidence confirms this supposition, and though the defective census of 1820 gives no clue to the real extent of iron manufactures at that date, we know that this was a period of depression and possibly of declining output.[17]

Ten years later the census does not help us to measure the volume of the nation's product, but a report submitted to the New York Convention in 1831, probably as authentic and complete as official statistics would have been, made the annual production of the country's furnaces and bloomeries equivalent to 191,536 tons of pigs.[18] This indicated that the national output had more than trebled, and possibly had nearly quadrupled, within twenty years.

In 1840 the census reported 804 furnaces in the United States, producing annually about 283,000 tons of pigs and castings. These figures, like those of 1810, embrace foundry products made from remelted pigs. However, this duplication is probably more than balanced by iron reduced directly from ore in bloomeries, which at this period may have approached 20,000 tons.[19] Consequently it seems not unlikely that the amount of iron annually made in the country had increased 100,000 tons during the preceding decade.

Ten years later the number of furnaces reported fell to 404, due partly to the centralization of plants, but largely to the classification of foundries and remelting furnaces under a separate heading. This year nearly 564,000 tons of pigs were produced. Probably some castings made directly at blast furnaces should be added to this amount, as well

[14] Bishop, *History of American Manufactures*, II, 54, Note 2.
[15] *American State Papers, Finance*, I, 138; II, 695; *cf. id.*, 428–429.
[16] *American State Papers, Finance*, III, 210; *cf.* United States, *Statutes at Large*, III, Chap. 22.
[17] *Documents Relating to the Manufacture of Iron*, 88; A. S. Hewitt, in *DeBow's Review*, XXII, 50, 51, Jan. 1857.
[18] New York Convention of 1831, *Journal, Reports of Committees*, 16.
[19] U. S. Census 1840, *Compendium*, 358.

as 20,000 or 30,000 tons of bloomery iron. It seems certain, therefore, that the amount of iron made in the country approached 600,000 tons, or had more than doubled during the ten years since the previous enumeration.[20] In 1856 the Association of Iron and Steel Manufacturers computed the amount of pig-iron made in the country at 813,000 tons, and in addition thereto 28,633 tons of bloomery iron.[21]

In 1860 the census returns give the annual production as 987,599 tons of pigs, to which should be added at least as much bloomery iron as was made in 1856, so that our total iron production that year probably exceeded 1,000,000 tons.[22] During the fifty years since the census took note of iron production, the population had increased fourfold, and the output of iron had multiplied nearly twentyfold.

Throughout this period Pennsylvania easily led in all forms of iron manufacturing. In 1840 it produced more than three times the value of New York, its nearest rival. New Jersey still ranked third in product, as in 1810, and Tennessee now held fourth place. In 1850 Pennsylvania ranked first, Ohio second, New York third, and Maryland fourth in iron production. The use of coal as a fuel already was making itself felt in the relative output of the States. In 1860, again, more than half the iron produced in the Union was made in Pennsylvania, Ohio ranked second, and New Jersey third. Pennsylvania held the same lead in bloomery as in furnace output, but in this branch of iron production it was followed by New York, with its Champlain forges, and by Tennessee.

Until the introduction of anthracite fuel foreign competition tended to limit eastern iron-making to better qualities than were supplied by British furnaces and rolling mills. Our more successful producers on the Atlantic slope made the high-grade charcoal pigs and blooms used for superior castings and hammered bars. In the industry of the time eastern forge-refined iron held the place now occupied by low-carbon steel; but west of the Alleghenies the market laid relatively less stress upon quality, and pigs usually were refined by puddling and rolling. British competition, therefore, might have checked the substitution of anthracite for charcoal smelting, had not improvements in furnace construction and practice and in refining processes and mechanism overcome many of the objections to iron made by the new method. As it was, the output of anthracite iron passed that of charcoal iron in 1855.[23] The amount smelted with soft coal and coke remained relatively less important than either of the former until after the Civil War.

[20] DeBow, *Statistical View of the United States* (U. S. Census 1850, *Compendium*), 181. These figures do not agree with those in the United States Census of 1850, *Abstract of Manufactures*, published five years later, *Sen. Ex. Doc.* 39, 35th Cong., 2d sess., 65.

[21] American Iron Association, *Bulletin*, 1858, in Lesley, *Iron Manufacturer's Guide*, 750.

[22] U. S. Census 1860, *Manufactures*, clxxx; *cf.* also *Documents Relating to the Manufacture of Iron*, 88; American Iron and Steel Association, *Annual Report*, 1875, 36, 37; *Mineral Industry*, I, 278.

[23] Swank, *Iron in All Ages*, 376.

FOUNDRY INDUSTRIES

It will be recalled that foundries, trip-hammer forges, cementation steel furnaces, and slitting mills were erected in the colonies before 1750; and it may be added that immediately following independence there was a great multiplication of these aids to reproductive manufacturing. The succeeding fifty years were the mill period of American metal-working, when small establishments, using minor water-powers and scattered through all parts of the country, were the typical agencies of secondary production. This was followed, after 1830, by a period of both geographical and administrative centralization.

Though foundries, forges, rolling mills, engineering works, and machine-shops did not necessarily seek identical localities, these works and the dependent manufactures that grouped around them usually centered in the same vicinity, and their general distribution lay within the same broad boundaries. Isolated blast furnaces usually made castings as well as pigs, and this was equally true whether they were located in Maine or Alabama. In fact, the main reason for incurring the additional expense of a furnace instead of a bloomery in districts having a limited market for iron was to supply the neighborhood with kitchen-ware and sugar and potash kettles. Moreover, until 1825 or later, a prejudice existed in favor of castings made at blast furnaces directly from the ore. They were supposed to be stronger and, for this reason, thin castings, especially stove plates, were usually manufactured at Pennsylvania and New Jersey charcoal furnaces, even though they were assembled and distributed by merchants in New York and Philadelphia. But foundries had been built before the Revolution, and after that event their number speedily increased. One motive for their erection was to accommodate the expansion of iron manufacturing in districts where an older blast-furnace industry was declining from lack of ore, as in eastern Massachusetts and Rhode Island. Another motive was to enable castings to be made to order in the immediate vicinity for the various requirements of our larger cities. The casting of iron and brass was often conducted in the same establishment. In 1793 Revere Foundry, at Boston, cast brass bells and cannon, and iron stoves, kettles, anvils, and hammer-heads.[24] About the same time the Shakers, at Shirley, operated a foundry where they cast both iron and brass.[25] Some of the early engineering works of New York developed from brass foundries, and that metal was used to a larger extent than at present in the first engines and machinery constructed in America.

Our early foundries, in addition to custom work, occupied themselves mainly with the manufacture of cooking utensils and similar

[24] *Cf.* Bishop, *History of American Manufactures*, II, 55; Dyer, *Early American Craftsmen*, 191–218.

[25] Bentley, *Diary*, II, 151, July 18, 1795.

articles of domestic use. In 1806 enough hollow ware was made in this country to supply home consumption.[26] Iron-founding then was on the eve of great expansion, due to the part it played in engine-building. Indeed, most foundries for heavy castings were soon associated with engine works. Later, specialization crept into the manufacture of smaller castings, and foundries were devoted solely to making plow-irons, stove-plates, or other articles of a single kind.

The manufacture of stoves ultimately became a separate branch of iron-founding, and between 1830 and 1860 was located at Providence, New York, Philadelphia, Albany, Buffalo, Pittsburgh, Cincinnati, and St. Louis. The early stove-plates cast at blast furnaces were assembled by stove-makers who from other sources supplied connecting rods, bolts, and sheet-iron parts. These makers were merchants rather than manufacturers. The plates were cast principally in Vermont, Connecticut, and eastern Pennsylvania. In 1833 Berks County shipped them to Philadelphia, New York, Boston, and Portsmouth.[27] Soon after 1830, Jordan L. Mott, of New York, who had adapted stoves to burning anthracite and added greatly to their popularity by this improvement, and Joel Rathbone, of Albany, also a stove-maker of large reputation, began to cast plates at foundries which they operated in the vicinity of their warehouses.[28] Thereupon the complete manufacture soon centralized at convenient distributing centers. In 1833 most of the 2,300 tons of iron remelted at Albany was made into stove-plates, and 1,250 tons of these were also brought from Philadelphia.[29] The enormous growth of the market for stoves, due to their adaptation to cooking and to burning coal, better facilities for distribution, a multiplying population, and especially the housing of that population in dwellings erected after the economy and convenience of this form of heating were recognized, caused a great extension of their manufacture. About the middle of the century it is probable that the annual production of stoves and ranges was 150,000, both in Philadelphia and in New York, 75,000 in Albany, 50,000 in Cincinnati, 30,000 in Providence, and 20,000 in Pittsburgh.[30] In 1857 the second largest molding house in the country was devoted exclusively to stove-casting. Philadelphia had five large works engaged solely in this manufacture, besides other foundries that made plates for the half hundred stove-makers, or assemblers, who still survived in that city of small tradesmen.[31]

The value of stoves and ranges made in the country was reported by the census of 1850 as over $6,000,000, and ten years later as nearly

[26] *American State Papers, Finance*, II, 171.

[27] Hazard, *Register of Pennsylvania*, XII, 88, Aug. 10, 1833; Freedley, *Philadelphia and Its Manufactures*, 290–291.

[28] *Bagnall Papers*, I, 213; Bishop, *History of American Manufactures*, III, 208.

[29] *Niles' Register*, XLIV, 353, July 27, 1833.

[30] *Hunt's Merchants' Magazine*, XXI, 56, July 1849; Providence, *Census of 1855*, 44–45; Wallis, *Special Report on New York Industrial Exhibition of 1853*, 42.

[31] Freedley, *Philadelphia and Its Manufactures*, 290–291.

$11,000,000. More than two-fifths of the latter sum was credited to New York State, and Albany and Troy each manufactured to the extent of over $1,000,000 annually. Pennsylvania ranked second in output and Ohio ranked third, but the former State produced scarcely more than one-half and the latter less than one-fourth the value manufactured in New York. New England, so prominent in many reproductive metal industries, held a relatively subordinate position in this branch, which was localized with regard to cheap transportation to purchasers. This consideration subsequently led to the transfer of the principal seat of stove manufacturing to the West.

The manufacture of other thin castings, such as kitchen utensils, sugar-kettles, bath-tubs, and builders' hardware, continued in several instances to be associated with stove-making. Some works also undertook the production of cast-iron railings, fountains, and lawn ornaments, which during the period of their novelty were very popular. City water and gas works called for cast-iron pipes, which were made in New Jersey in 1821,[32] and for hydrants and lamp posts. Also earlier forms of structural iron were made at foundries. In 1827 cast-iron rafters, for what then were called fire-proof buildings, were manufactured in this country, and about this time cast pillars and store fronts were employed in construction.[33] Among the multitude of novel foundry products that first came into request during this period were car-wheels. The earliest of these, following the example of coaches, were made partly of wood, but steam railways soon adopted hollow cast-iron wheels. As these must combine lightness with absolute reliability under exacting service, their manufacture forced improvements in foundry practice. The iron used for making them was not only of selected quality, but was mixed and tested, and if necessary reaccommodated to its purpose by further mixing before being cast. In order to insure uniform contraction, wheels were cooled slowly for several days in modified annealing furnaces constructed for this purpose.[34] These requirements caused wheel-founding, like stove-making, to be

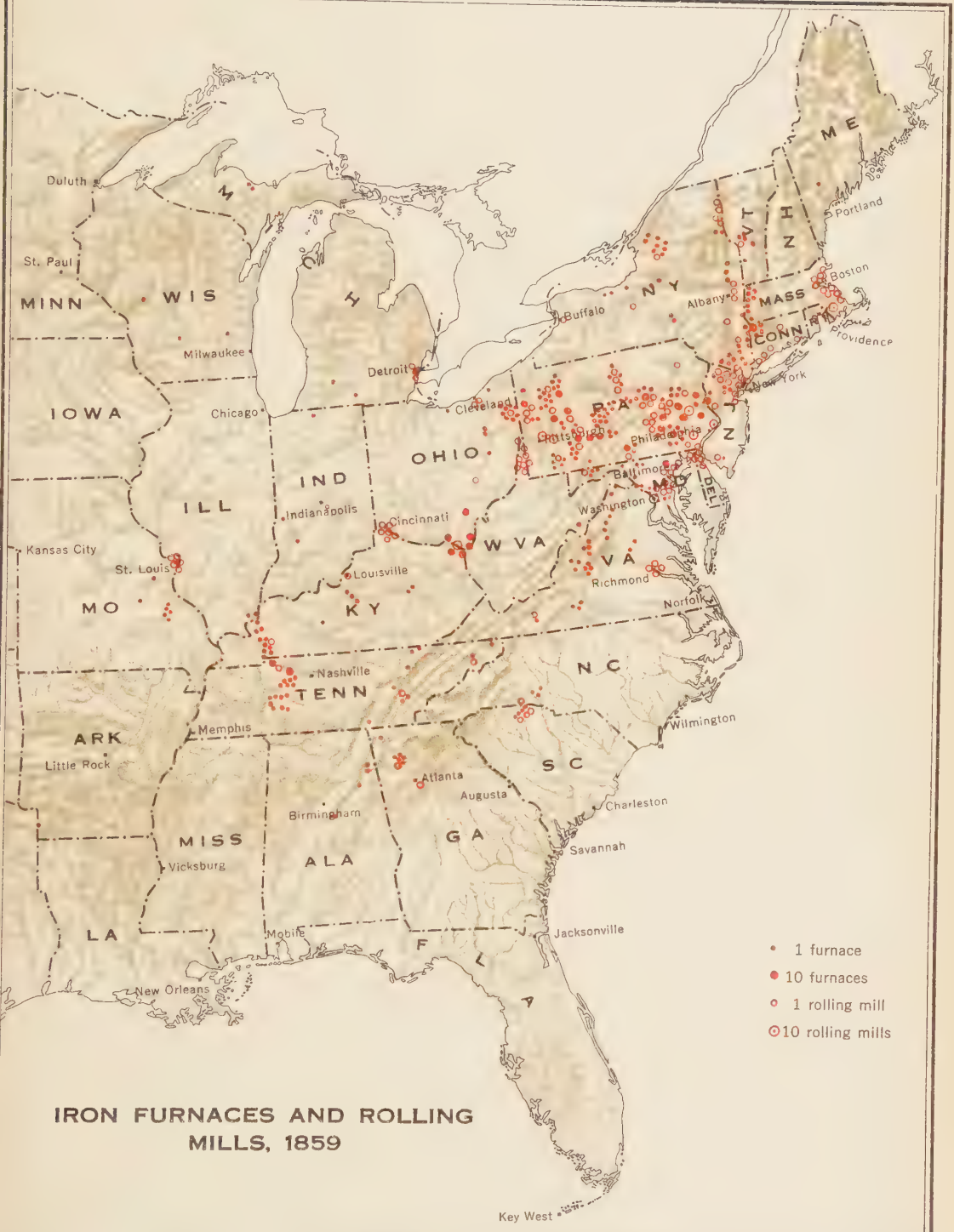
[32] *Niles' Register*, XX, 375, Aug. 11, 1821.

[33] *Niles' Register*, XXXII, 418, Aug. 25, 1827; XL, 281, June 18, 1831; Hazard, *Register of Pennsylvania*, V, 400, June 19, 1831.

[34] Bishop, *History of American Manufactures*, III, 27, 210, 290.

IRON FURNACES AND ROLLING MILLS IN 1859

Plate 3 is based upon the directory and maps in Lesley's *Iron Manufacturer's Guide*. Wherever possible single establishments are indicated by small dots or circles. Elsewhere a large dot or large circle represents ten forges or ten rolling mills in the same locality. In some instances, particularly in Pennsylvania, so many forges and mills were concentrated in a small area that in mapping the dots and circles extend beyond the geographical limits within which the plants were situated. Thus the map shows these plants in a continuous chain, or spread evenly over a large area, when in fact all the furnaces and mills in an entire county may have been in two or three cities. Consequently the groups of works shown in eastern Massachusetts, northern New Jersey, or northern Delaware must be understood to represent only approximately the real location of individual establishments. The larger dots or circles, signifying groups of ten furnaces or rolling mills, indicate that within a small area there was about that number of plants. In general the larger dots or circles indicate important iron-working centers. The map does not aim to show the quantity of iron and steel produced, but the location and number of furnaces and mills in operation. A rolling mill should be shown at Chicago.



IRON FURNACES AND ROLLING MILLS, 1859

ALBION COLLEGE
LIBRARY

specialized, and affected its localization. In 1860 the principal plants were at Worcester, Troy, Rochester, Buffalo, Jersey City, Philadelphia, Wilmington, Cincinnati, Pittsburgh, and Chicago. The works at Wilmington were the largest in the country.[35]

ENGINE AND LOCOMOTIVE WORKS

While the manufacture of light castings tended to specialize in separate branches, heavy casting became a department of engineering. The latter developed from founding cannon, mill-irons, press screws, and rollers for slitting and sugar mills, which were operations usually performed at smelting furnaces and antedating the age of steam, to making the engine and machine parts required by this new power. Many motives compelled the location of engine works at sea and river ports not in the immediate vicinity of ore furnaces. Steam both demanded and made possible working metal in larger masses than had been previously attempted. Prior to its introduction artillery and anchors respectively were the heaviest products of the furnace and the forge. They retained this position for several years after engine castings began to be manufactured. Maximum foundry capacity grew faster than forge capacity, and during the pioneer period of machine construction large parts were cast. Where elasticity and tensile strength were required, wood sometimes took the place of forgings. Consequently our early engineering plants employed mainly founders, carpenters, and blacksmiths. The nucleus of these establishments was the furnace, to which in the course of time other mechanical equipment gradually was added. On the other hand, shops for making light machinery, that called for small and easily transported castings, started with bench-tools and lathes, and for a time procured their foundry parts from the custom furnaces erected to supply this demand in the vicinity of manufacturing towns.

Though the first practicable steam motors built in this country were for mills and pumps, the development of engineering works was controlled mainly by the demands of transportation. First steamboats, then railways, and finally steamships made new and more exacting requirements of this industry. For many years all engines were built to order, but shortly before the Civil War manufacturers began to carry in stock completed engines and standardized engine parts.[36]

When Fulton began to build steamboat machinery at Jersey City, about 1808, he had his castings made at New York City foundries.[37] The same year an engine-shop was started at Pittsburgh, where the first foundry west of the Alleghenies had been erected four years previously.[38] After the experiments with wood and cast-iron mentioned,

[35] U. S. Census 1860, *Manufactures*, clxxxv.
[36] See 509, *f.*
[37] Bishop, *History of American Manufactures*, III, 119, 120.
[38] McLane, *Report on Manufactures*, II, 239, question 3; Bishop, *History of American Manufactures*, II, 105; Swank, *Iron in All Ages*, 226; Royall, *Travels*, II, 95. *Cf. Minutes of Evidence, Orders in Council*, 446, in Great Britain, *Parliamentary Papers*, 1812, III; McMurtrie, *Sketches of Louisville*, 131–132.

earlier boilers were for a time made of copper, and many small machine castings were of brass; consequently, these pioneer works were chiefly assembling and fitting shops. Within a few years, however, this business allied itself with iron-founding, either at establishments already in existence or at works erected especially for that object. Before 1830 there were foundries at Pittsburgh, Wheeling, and elsewhere along the Ohio that are described as devoted chiefly to the manufacture of steam-engines. Their equipment included a cupola furnace and a machine for boring cylinders, both worked by a steam-engine.[39] Some furnaces had used water-driven machines to bore cannon about the time of the Revolution.[40]

In 1828 castings of 4 tons' weight made at Pittsburgh are mentioned for their size, but a few years later we are informed that bed-plates and shafts for engines, weighing 30 or 40 tons, were made at a Wheeling foundry.[41] About the middle of the century the Novelty Works at New York cast a 60-ton bed-plate for the engine of the steamship *Arctic*. The large low-pressure engines of this period had enormous cylinders. Those in a Fall River boat, built in 1854, were nearly 9 feet in diameter and 14 feet long.[42] A machine-shop in Philadelphia was equipped to bore castings 16 feet in diameter and 18 feet long. Some blowing-engines built at that city for coal mines had a 10-foot stroke and their walking-beams were supported on cast-iron pillars 30 feet high.[43] The Corliss Engine Works, at Providence, made geared fly-wheels 25 feet in diameter, that weighed 32 tons when turned, finished, and cogged.[44]

Long before the middle of the century most engine works were equipped to make large castings and doubtless to finish small forgings, but comparatively few plants had facilities for heavy forging. In Connecticut 5-ton anchors were made for the navy in 1828,[45] but it was not until 1841 that the first heavy engine forgings were made in this country. These consisted of a 6.5-ton shaft and connecting-rods weighing about two-thirds that amount, forged at the Canton Iron Works near Baltimore. They were intended for a steam frigate under construction for the Russian Government at New York, and the shaft was considered sufficiently remarkable to be exhibited in that city.[46] Twenty years later the engine works of New York still had forging done at outside plants, for at this time the 23-ton shafts for the ship *Constitution*, built on the East River, were made at the Bridgewater Works in

[39] Royall, *Travels*, II, 104–106, 168; Drake and Mansfield, *Cincinnati in 1826*, 53; McMurtrie, *Sketches of Louisville*, 132.

[40] Virginia, *State Papers*, I, 453–454; *cf.* also Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1861, 89.

[41] *Niles' Register*, XLIII, 4, Sept. 1, 1832.

[42] Bishop, *History of American Manufactures*, III, 123; *cf.*, however, Freedley, *Philadelphia and Its Manufactures*, 290.

[43] Bishop, *History of American Manufactures*, III, 28; Freedley, *Philadelphia and Its Manufactures*, 289, 326.

[44] Bishop, *History of American Manufactures*, III, 312.

[45] *Niles' Register*, XXXIV, 251, June 14, 1828. In 1743, an anchor one-fourth this size was regarded the largest ever forged in New York; *New York Mercury*, June 4, 1743, quoted in New Jersey, *Archives*, XXIV, 372–373.

[46] *Worcester Spy*, Apr. 21, 1841.

Massachusetts,[47] and the still larger forgings for the steamer *Adriatic* were made at Reading.[48]

Shortly before the Revolution unsuccessful steam-engines for pumping water were built at Philadelphia and New York, and almost immediately after the war practicable engines on the Bolton and Watt plan, built in this country, ran a steam ferry on the Delaware, and a pumping-station and a slitting mill at Philadelphia. Their regular manufacture was begun by Oliver Evans, at the Mars Works, Philadelphia, in 1803, and five years later the engine shops previously mentioned were started near New York City and at Pittsburgh.[49] A steam-engine of uncertain origin is said to have been in operation in the latter city as early as 1794.[50]

The census of 1820 reported engine-builders at Litchfield, New York, Pittsburgh, Steubenville, Cincinnati, and Louisville, and we know that steam machinery was manufactured at this time in several other places. Thereafter iron works and repair shops throughout the country occasionally made engines, and plants devoted mainly to their construction multiplied wherever there was lake or river navigation. In 1828 six foundries at Pittsburgh were engaged in this business. They employed about 100 hands and completed between 20 and 30 engines annually. In 1830, it is said, 100 were built at Pittsburgh and 150 at Cincinnati.[51] The former city sold engines in South America.[52] The Ohio River cities made both stationary and steamboat engines, mostly of the high-pressure type invented by Oliver Evans, which had been improved and simplified since its adoption west of the mountains. The largest installations were at rolling mills.

After 1830 the introduction of steam-power on ocean vessels, its growing use in large eastern factories, and certain special demands, such as those of deepening anthracite mines of Pennsylvania for steam blowing and pumping machinery, caused a rapid enlargement of engineering plants on the Atlantic seaboard and a corresponding improvement in their equipment. One of the earliest and most extensive of these establishments was the West Point Foundry, at Cold Springs, which, in addition to its large plant on the Hudson, later operated machine-shops in New York City.[53] In the city itself the Allaire Works, which were a successor of Fulton's early shop at Jersey City, were established in 1816; but no other important firm entered the field of marine-engine construction until 1830, when the Novelty Works were founded. The

[47] *Boston Commercial Bulletin*, Mar. 29, 1862.

[48] Swank, *Iron in All Ages*, 462–463. In 1850, British investigation described a 7½-ton Condy hammer, at Franklin Forge, in New York City, as "the largest hammer the Committee has yet seen, either in Great Britain or the United States"; Committee on the Machinery of the United States of America, *Report*, 13, in Great Britain, *Parliamentary Papers*, 1854–1855, L.

[49] Mease, *Picture of Philadelphia*, 76–77; Franklin Institute, *Journal*, CII, 253–268, Oct. 1876.

[50] Bishop, *History of American Manufactures*, I, 568.

[51] Bishop, *History of American Manufactures*, II, 346; New York Convention of 1831, *Journal, Reports of Committees*, 18.

[52] McLane, *Report on Manufactures*, II, 253.

[53] Saxe-Weimar, *Reise durch Nord Amerika*, I, 186; McLane, *Report on Manufactures*, II, 115; *American Repertory*, III, 363, 364, June 1841; *Farmer and Mechanic*, I, 172, Apr. 8, 1847; Bishop, *History of American Manufactures*, III, 178.

Morgan Works followed eight years later, and other large enterprises began toward the middle of the century.[54] During all this period many stationary engines were built in New York at smaller shops and foundries.

The first large engine-builders on the Delaware were the Port Richmond Company, founded in 1828. They were followed about 1840 by the Southwark and the Penn Companies. All of these build stationary as well as marine engines, and some of them manufactured sugar mills.[55] The latter were made also at Pittsburgh, Wheeling, and Cincinnati.[56] However, by the date just mentioned the engineering industry was so specialized that the building of marine-engines was recognized as the principal if not the exclusive function of certain works on the Atlantic coast, and the construction of steamboat machinery as the peculiar business of certain plants upon the Ohio, Mississippi, and Great Lakes.

Locomotive-building, partly on account of patented improvements and the development of individual types, became very early a distinct branch of manufacturing. An experimental engine built in 1829 by Peter Cooper, at Baltimore, was followed during the next year and the ensuing spring by the construction of three locomotives at the West Point Foundry.[56] In 1832 three others were built at York, Pennsylvania, and thereafter construction followed rapidly at several places. Philadelphia immediately took the lead in this industry. The Baldwin Works were established in 1832 and the Norris Works, at one time among the most famous in the world, in 1834.[57] The latter year the Locks and Canals Company, at Lowell, entered the business, and in 1835 the first locomotive west of the Alleghenies was built at Pittsburgh.[58] In 1837 the Rogers Works, at Paterson, took up this manufacture.[59] During this first decade many locomotives were made in the United States for European orders, and American engineers built the first railway shops in Russia.[60] Before 1850 the requirements of numerous short lines of railway, serving distinct and unconnected areas, and each requiring independent facilities for repairs, caused locomotive building to be undertaken at widely separated points. Shops for their construction were started at Portland, Alexandria,

[54] *Hunt's Merchants' Magazine*, XVI, 93, Jan. 1847; XXIII, 463, Oct. 1850; Bishop, *History of American Manufactures*, III, 118–130; *Bagnall Papers*, I, 229–300.

[55] Freedley, *Philadelphia and Its Manufactures*, 326–328; Bishop, *History of American Manufactures*, III, 28–32.

[56] *Niles' Register*, XXXVIII, 293, June 12, 1830; XLIV, 99, Apr. 13, 1833; XLIV, 267, June 23, 1833; *Hunt's Merchants' Magazine*, XXVII, 116, July 1852; Bishop, *History of American Manufactures*, 346; Brown, *History of the First Locomotives in America*. Steam road motors had been built in America before this; Bishop, *History of American Manufactures*, II, 91; *Niles' Register*, XXXIX, 6, Aug. 28, 1830.

[57] Freedley, *Philadelphia and Its Manufactures*, 306–311; Bishop, *History of American Manufactures*, III, 25, 26.

[58] *Bagnall Papers*, III, 2101–2102; Hazard, *Register of Pennsylvania*, XVI, 174, Sept. 12, 1835.

[59] Bishop, *History of American Manufactures*, III, 188–190; *Farmer and Mechanic*, II, 250, May 25, 1848.

[60] *Cf.* 362–363, preceding; *Niles' Register*, LIII, 240, Dec. 9, 1837; LV, 305, Jan. 12, 1839; LVI, 146, May 4, 1839; LVI, 322, July 20, 1839; LVII, 48, Sept. 14, 1839; LVII, 51, Sept. 21, 1839; LVIII, 96, Apr. 11, 1840; LX, 65, Apr. 3, 1841; *American Repertory*, II, 464–465, Jan. 1841; *Hunt's Merchants' Magazine*, XV, 107, July 1846; *Farmer and Mechanic*, I, 6–67, Feb. 4, 1847; II, 167, Apr. 6, 1848.

Richmond, and St. Louis.[61] The thirty locomotives operated by the Western Railway of Massachusetts, in 1844, had been made at Lowell, Boston, Baltimore, and Philadelphia.[62] Ten years later Taunton added this manufacture to its other machine-making industries.[63]

Our first locomotives had wooden frames and wheels, and their manufacture required little or no heavy forging. Their weight varied from 10 to 25 tons.[64] It lies without our province to trace their subsequent mechanical development and the differentiation of American engines and rolling-stock from those of Europe. An all-iron passenger car was operated by the Erie Railway in 1859, but car construction was more closely allied with coachmaking than with engineering manufactures.[65] It was nearly thirty years before the Baldwin Works made their thousandth locomotive.[66] The output of the Norris Works was somewhat larger, and they were building 40 annually before 1850, and had completed 937 by the end of 1857.[67] In 1860, of the 470 locomotives made in the United States, three-fourths came from Philadelphia and Paterson, and the largest works in the country were at the latter city.[68]

After receiving the first suggestion from Great Britain, this country immediately struck out on independent lines in the construction of steam machinery. The high-pressure engine of Evans, and the great improvements in steam economy and steam control accomplished by the inventions of George H. Corliss, are a common debt of all countries to the United States. Much progress was made in simplifying and cheapening this machinery. Between 1850 and 1860 our engine-makers sought to enlarge their domestic market. They introduced small standardized steam-motors with interchangeable parts, following the principle applied in the construction of turbines, pumps, and agricultural machinery, for the use of stores, mechanics' shops, and especially of farmers. These small engines were sold by catalogue, like pumps, plows, fanning mills, and sewing-machines, and their manufacture naturally centralized tributary to the West, where farms were larger and industrial establishments were smaller than in the East. The best-known firms engaged in their production were at Rochester and Cincinnati.[69]

We have no means of ascertaining the volume and distribution of steam-engine manufactures in the United States prior to the Civil War, as the classification of census statistics was still too incomplete to afford data on this subject. Such figures as we have lead to the inference

[61] *Hunt's Merchants' Magazine*, XXI, 575, Nov. 1849; XXVI, 117, Jan. 1852; Hogan, *Thoughts on St. Louis*, 18; *cf.* Gobright, *City Rambles, or Baltimore as It Is*, 10–11.
[62] Western Railroad of Massachusetts, *Report for 1844*.
[63] *Bagnall Papers*, III, 1825–1826; Bishop, *History of American Manufactures*, III, 270.
[64] New York, *Railroad Commissioners' Annual Report*, 1855, xi.
[65] *Boston Commercial Bulletin*, Dec. 10, 1859.
[66] Baldwin Locomotive Works, *40,000th Locomotive*.
[67] Freedley, *Philadelphia and Its Manufactures*, 310.
[68] U. S. Census 1860, *Manufactures*, clxxxviii–clxxxix.
[69] Bishop, *History of American Manufactures*, III, 225, 382.

that by 1860 engines were built in nearly all the States and that their largest production was in New York, Pennsylvania, Ohio, and Massachusetts.

ROLLING MILLS

Iron-rolling developed independently of smelting, casting, and forging. It began with the little mills erected in the colonies for rolling and slitting nail plates. At such an establishment near Providence, in 1789, the operations were described as follows:

"First, cutting off cold bars of iron of various sizes with a pair of large shears into pieces about 13 to 20 inches in length. These pieces were then put into an air furnace and heated with sea coal, charcoal, coal brands, and dry pitch pine wood, till they were in a white heat. They were then taken out one by one and put into the rolling mill, which plates and draws each piece from three to five feet long, according to the length of the bars, and of a thickness suitable to the size of 10 penny nails—but may be varied to other sizes as they are wanted. As the flattened bar leaves the rollers a person receives it and puts it into the cutters, standing in the direction of and at a proper distance from the rollers, and it is there cut into five or more rods, according to the width of the bar. These rods are then taken out on the opposite side of the cutters and laid in heaps for packing in bundles of half a cwt. each. There are two large water wheels, one carrying the rollers, and the other the cutters."[70]

After the British act prohibiting their erection in the colonies was nullified by independence, the number of such mills rapidly increased. Plymouth and Bristol Counties had 11 in 1795 and made 1732 tons of nail-rods, hoops, and sheet-iron.[71] In 1809 Massachusetts had 12 mills with an annual product of 3500 tons.[72] The very incomplete census of 1810, which omits all the Massachusetts mills, reported 18 in Pennsylvania and 14 in other States. Probably there were about 50 in the country. Some of these were on the upper tributaries of the Ohio.[72] Notwithstanding the introduction of nail machinery, even as late as the Civil War nail-rods continued to be sold by country stores, especially in the South, where custom, prejudice against machine-made goods, and a desire to employ otherwise unoccupied labor favored the survival of primitive manufacturing methods.[73]

Meanwhile, rolling mills became larger and added to their functions. When engine-boilers began to be made of iron, this new requirement was met by rolling blooms, hammered at the forge to a thickness of 1.5 inches and subsequently reheated at the mill in a grate furnace, into 0.25-inch plates, which were sheared to dimensions and sold in standard sizes. This manufacture began in Chester County soon after 1815. The sheet trimmings were at first made into nails, but later were piled, reheated to the welding-point, and again rolled into plates—a precedent subsequently adopted by rail-makers to attain a different object.[74]

[70] *Providence Gazette*, Jan. 17, 1789.
[71] Ebelings, *Erdbeschreibung von Amerika*, I, 542.
[72] *American State Papers, Finance*, II, 438, 695.
[73] Olmsted, *Seaboard Slave States*, 613; *id., Journey through the Back Country*, 280.
[74] Charles Huston, in Depew, *One Hundred Years of American Commerce*, I, 323; *cf.* Swank, *Iron in All Ages*, 195.

Rolling mills, about this time, in addition to their greater capacity and adaptability for reshaping iron, began to replace the forge-hammer in refining. The first works that rolled bars from puddled pigs were erected in western Pennsylvania in 1817, on the site of an earlier rolling and slitting mill. For some years this process made but slow headway in America and was confined to the West; it was not adopted in New England until 1835. The employment of single furnaces, and hastier treatment, kept the process more primitive in the West than in the East, where double furnaces were used and more time was allowed for the refining operation. Boiling, a variant of puddling, by which pigs were converted directly into blooms and bars, extended at the expense of puddling proper, largely as a result of the introduction of artificial fluxes, which began during the early thirties, apparently with the use of Champlain ores instead of puddler's slag for the furnace bath. Indeed, it was this search for a better puddler's fix that brought the first Lake Superior ores to the East, where they were used in this secondary process before they were smelted directly into pigs.[75] However, even the Pittsburgh mills, which were among the largest establishments in this country, for some years after puddling was introduced rolled principally blooms refined from furnace iron at the Juniata forges; and the forges and rolling mills sometimes were owned by the same proprietors.[76] These mills made nail-plates and boiler-sheets and performed the first operations in the manufacture of shovel and ax blanks. Puddling began at that city about 1820 and was used to refine pigs from the Mahoning district and Tennessee, which were thus converted into bars and commercial shapes.[77] But the preference for forge-drawn iron in this country, its better adaptation to our needs, and the facilities we possessed for making it caused our rolling mills, until the railway period, to be devoted much more largely to reproductive manufactures than to refining. In 1828, when the demand for rails began, there were a dozen mills east of the Alleghenies equipped to roll bars from blooms, the larger of which might make 3,800 tons a year. All of these were in the States between Maryland and Massachusetts; in addition, there were a number of "common rolling mills" which might be altered for this purpose. In the record of attempts made to procure domestic rails at this time, no mention is made of puddled iron. All the mills accessible to the coast were unable to furnish 15,000 tons of strap iron required by the Baltimore and Ohio Railroad to face its wooden rails, but this inability was due to the limited capacity of refining-forges rather than to lack of rolling facilities.[78]

[75] Overman, *The Manufacture of Iron*, 259–274, 276, 282–283; Williams, *The Honorable Peter White*, 49, 139–142; Swank, *Iron in All Ages*, 217, 461.

[76] *American Manufacturer*, Oct. 22, 1829; Royall, *Travels*, I, 91–92; Hunter, *Iron Industry at Pittsburgh*, 38.

[77] Hunter, *Iron Industry at Pittsburgh*, 20; Swank, *Iron in All Ages*, 228.

[78] *Sen. Doc.* 192, 20th Cong., 1st sess.

Mill plants in 1830 presented a great contrast to the little establishment at Providence forty years before. Their larger development, however, was very recent. Within three years the output of rolled iron at Pittsburgh had trebled. At that city 8 mills annually rolled 6,000 tons of blooms and 1,500 tons of puddled pigs. The largest of these was driven by two steam-engines of 100 horse-power each and had a yearly output of 1,500 tons of bar, sheet, and boiler iron, and 325 tons of nails.[79] These larger establishments were rather characteristic of the West, and eastern mills still were employed mainly in rolling common bars into sizes of 0.5 inch and under, and continued to resemble closely their colonial predecessors. There were several small plants of this sort in Morris County, New Jersey, and in Lancaster County, Pennsylvania.[80] A return of the rolling mills and nail factories in New York State, in 1830, enumerated 8 such establishments, making 3,500 tons of nails and 5,800 tons of hoops, tires, and sheet-iron.[81] By this time there were puddling furnaces in both New York and eastern Pennsylvania.[82] Matched rollers, for rolling tires and plates with smooth edges to true dimensions, were installed at the Peru Works, in Clintonville, and were regarded as an important innovation. They enabled tires to be rolled instead of drawn under the hammer, as previously, and thus greatly cheapened their cost.[83]

A new era in iron-rolling began about 1845, when the first heavy rails were made in this country. Rail mills were immediately differentiated from mills for making heavy bars from pigs or blooms, as the latter had been differentiated previously from common mills for rolling light plates and shapes from hammered bars. The first steam-car tracks in America consisted of light iron straps spiked to a continuous curbing of cut stone, or to wooden stringers laid on cross-ties. Some rails of this kind were made in the United States, but under a law remitting duties on railway iron most of those used prior to 1845 were imported. In 1844 the Mount Savage Works, in Maryland, began to roll **U** rails, and also **T** rails resembling, in everything except weight and material, those employed at the present day. The following season the Montour Works, at Danville, Pennsylvania, which for many years were the largest in the country, started operations; and in 1846 several mills in New England, New Jersey, and Pennsylvania began to manufacture heavy rails of the designs just mentioned.[84] Within three years there were 16 rail mills in the country, with an

[79] Royall, *Travels*, II, 93–94; McLane, *Report on Manufactures*, II, 254.

[80] *Banner of the Constitution*, I, 357, May 22, 1830; *Sen. Doc.* 142, 21st Cong., 1st sess., 3; *Report on American Manufactures*, May 18, 1830.

[81] McLane, *Report on Manufactures*, II, 122.

[82] *Carey Clippings, Manufactures*, XVI, 295–297; *Lowell Journal*, May 30, 1828; *Niles' Register*, XXXIII, 192, Nov. 17, 1827; Hazard, *Register of Pennsylvania*, XIV, 383, Dec. 13, 1834, quoting *Miners' Journal; id.*, XIV, 415, Dec. 29, 1834; *Niles' Register*, XLVII, 315, Jan. 10, 1835; *cf.* also *Sen. Doc.* 21, 62d Cong., 1st sess., 497.

[83] *American Manufacturer*, Apr. 9, 1829.

[84] Swank, *Iron in All Ages*, 434–435.

annual output exceeding 100,000 tons, and by 1860 the latter product had doubled.[85] Eastern Pennsylvania was the center of this industry, though mills were erected in the South and West to serve the needs of a still disconnected railway system and especially to re-roll worn rails.

A single rail mill in the early fifties had twice the aggregate capacity of all the mills which Pittsburgh boasted twenty years before. Coal smelting and puddling were the only iron-making processes productive enough to keep such machinery supplied with materials. The volume of operations made it important to assemble, so far as possible, all stages of manufacture in one neighborhood. These conditions influenced localization, so that while the general distribution of rail-making did not differ materially from that of other heavy iron-working, its particular centers in several instances were at points hitherto not associated with similar forms of industry.

The development of rolling in response to railway requirements involved no new principles of manufacture and, except in capacity and mechanical details, rail mills did not differ from mills for rolling other shapes from puddled blooms; yet the composition of the rails themselves acquired great importance, on account of the vast economies attained by adding to their durability under the increasing strain and wear of higher speeds and heavier trains. The more exacting demands thus instituted reacted on furnace and refining practice and appeared in rolling mill technique in new methods for combining iron of different qualities and origin, which was piled and rolled together at a welding heat to form the distinct elements of a rail section.

Plants for rolling other shapes than rails now came to be known as merchant mills. Usually these formed a department of general iron-works and supplied varied commercial demands. Perhaps the most notable instances of specialization were at Wilmington and in Cecil County, Maryland, where a number of mills made sheet-iron exclusively. They were controlled wholly or in part by makers of galvanized iron at Philadelphia.[86] The manufacture of boiler plates was localized tributary to the same city.[87] This branch of rolling suffered less from British competition than rod-making and rail-making, because foreign iron was considered inferior to American charcoal iron for high-pressure boilers. In 1856 eastern Pennsylvania had 63 rolling mills. Ten of them were at Philadelphia and rolled in the aggregate 17,000 tons annually.[88] Like early slitting mills, these urban establishments were primarily adjuncts to local reproductive manufactures. Works at Pembroke, Maine, annually puddled, in contact with Champlain ore, 6,000 tons of Hudson River pigs, which they converted into

[85] *Hunt's Merchants' Magazine*, XVI, 97, Jan. 1847; U. S. Census 1860, *Manufactures*, clxxxiii; *DeBow's Review*, XXII, 519, May 1857; French, *Iron Trade*, 154.
[86] *DeBow's Review*, XXIII, 28, July 1857; Freedley, *Philadelphia and Its Manufactures*, 297.
[87] Lesley, *Iron Manufacturer's Guide*, 757.
[88] Freedley, *Philadelphia and Its Manufactures*, 286–287.

gas plates and ax bars for manufacturers at Taunton, Douglas, and New Haven, and into nails and rivets.[89] At Boston, Bridgewater, Taunton, and Worcester engineering works rolled locomotive tires and other special shapes for the varied industrial requirements of New England. The Fall River Iron Works, as early as 1846, rolled yearly 13,000 tons of puddled pigs and scrap iron into rods, bars, hoops, and nail-plates, mainly for New York purchasers.[90] Twenty years earlier than this a rolling mill, with a capacity of 200 tons a week, had been established at Esopus Creek, in Ulster County, to make bar iron and boiler-plates from puddled Baltimore pigs for the same market.[91] Unlike Philadelphia, New York City itself was not a rolling-mill center. In 1845 what were then the largest mills in the country were built at Trenton. Nine years later these works rolled the first structural wrought-iron beams made in America, and subsequently they manufactured I beams.[92] In 1850 the Abbott Mills, at Baltimore, held the country's record for size with sheet rolls 8 feet long. During the Civil War these works manufactured our first armor plate.[93] The Tredegar Works, at Richmond, built in 1836, rolled light railway-iron the following year. Before the war they manufactured U rails and heavy machinery.[94] In 1857 there were four other rolling mills in Richmond and its vicinity, but only the Tredegar, the Amory, and the Richmond Works puddled iron.[95] Of the 6 rolling mills reported in operation south of Virginia, 2 near Spartanburg and 2 in Georgia had puddling furnaces.[96] The capacity of a plant at Atlanta was 18,000 tons of new and re-rolled rails per annum. Among the mills of some reputation, established about the middle of the century, were the Rensselaer Mills at Troy and the Pratt Works at Buffalo, both built in 1846, and the LaClede Mills at St. Louis, erected in 1850. Pittsburgh, Wheeling, and Cincinnati were the largest rolling-mill centers in the West. In 1850, at Cincinnati and immediate vicinity, 10 mills had an aggregate capacity of 21,000 tons per annum.[97]

Compared with the large works of eastern Pennsylvania, however, most establishments in other parts of the country were minor producers. The furnaces and mills built at Scranton, about 1840, transformed that place, within twenty years, from a hamlet of 5 dwellings to a town of 15,000 inhabitants. During the Civil War the rolling mills at that point were served by 4 blast-furnaces, 80 puddling-furnaces, and

[89] *Boston Commercial Bulletin*, Mar. 17, 1860.
[90] *Hunt's Merchants' Magazine*, XV, 213, Aug. 1846; *National Magazine*, III, 46–47, June 1846.
[91] *Carey Clippings, Manufactures*, XVI, 295–297; *cf. Olde Ulster*, VIII, 44, Feb. 1912.
[92] *Hunt's Merchants' Magazine*, XVIII, 444, Apr. 1848; Swank, *Iron in All Ages*, 161.
[93] Bishop, *History of American Manufactures*, III, 112.
[94] Edwards, *Statistical Gazetteer of Virginia*, 1854, 68; *Industrial South*, VI, 394, Oct. 1886; *Farmer and Mechanic*, II, 227, May 11, 1848; Swank, *Iron in All Ages*, 271; Bruce, *Rise of the Iron Industry in Virginia*, Chaps. IV and VII.
[95] American Iron Association, *Bulletin*, 1857, p. 108; Lesley, *Iron Manufacturer's Guide*, 244.
[96] Lesley, *Iron Manufacturer's Guide*, 245–246.
[97] *Hunt's Merchants' Magazine*, XXII, 111, Jan. 1850; Plate 3, 504, preceding.

15 heating-furnaces with 6 trains of three-high rolls, and their annual capacity was 35,000 tons. Of equal or greater extent were the works at Phœnixville, not far from Philadelphia, and near the site of the oldest iron-mine in Pennsylvania. They consisted of 3 blast-furnaces, 22 double and 12 single puddling-furnaces, 24 heating-furnaces, and rolling mills having a yearly capacity of 20,000 tons of rails and 15,000 tons of beams, girders, and other shapes. These mills rolled round iron 12 inches in diameter and bars 25 feet long and 8 inches square.[98] This was the culmination of heavy iron-rolling in the United States before the Civil War, and was rivaled, as an engineering achievement, only by the 34-ton shaft for the steamer *Artic*, fashioned at Reading Forge, and by the 65-ton bed-plate for the steamer *Baltic*, cast at the Morris Foundry, in Philadelphia. Such works were housed in structures that would command attention even to-day. The Cambria Rolling Mill, at Johnstown, erected in 1857, was 612 feet long and 100 feet wide, with cross-wings 372 by 74 feet.[99]

According to the census of 1860 there were 256 establishments in the United States that rolled iron, and their total product exceeded 500,000 tons. Not quite half of this amount consisted of railway iron, of which we now produced rather more than we imported. The quantity of merchant bars and structural iron made in the country nearly equaled the quantity of rails. In addition to these, 30,000 tons of boiler and nail plates and one-third that amount of sheet-iron were manufactured. The value of rolling-mill products had doubled within ten years, but the distribution of the industry showed little change. Pennsylvania rolled more than half of the iron manufactured in the country and about six times as much as Massachusetts and Ohio, which held second place in this industry. The ranking of the two latter States was ambiguous, the former leading in volume and the latter in value of product. Virginia, which at this time included Wheeling, was the only southern State in which this industry was important.[100]

MACHINE-SHOPS

Accompanying increased facilities for producing iron in great volume and handling it in large masses, came machinery for converting it rapidly and economically into smaller articles. The technical improvements already described, that enabled our manufacturers to reproduce mechanically any quantity of uniform shapes, and to do this with such precision that the shapes could form interchangeable parts of complex combinations, vastly extended the field of metal consumption. The same influences localized more definitely the branches of manufacture thus created or enlarged.

[98] Bishop, *History of American Manufactures*, III, 86–88.
[99] Fritz, *Autobiography*, 119–120; Bishop, *History of American Manufactures*, III, 89.
[100] U. S. Census, 1860, *Manufactures*, clxxxiii.

In the handicraft period the only metal-working occupation thus geographically centralized was nail-making. This pursuit gave color to the industrial life of Plymouth and Bristol Counties in Massachusetts and of Litchfield County in Connecticut.[101] Soon after the introduction of machinery, small works for the manufacture of nails were built all over the country, to supplant household forging in their respective neighborhoods. But the commercial manufacture centered in eastern Massachusetts, northern New York, eastern Pennsylvania, and at Pittsburgh and Wheeling. During the thirty years between 1799, when nail-machines are first mentioned at Pittsburgh, and 1829, the quantity of nails annually made in the city reached 556 tons; only three years later the output had increased to 2,096 tons.[102] In 1855 three leading nail-factories at Wheeling made 180,000 kegs.[103] But the great center of this manufacture continued to be Massachusetts, which in 1860 made more than one-third of the country's product.[104] This was partly due to the early localization of the industry in that State, but its continuance in a district relatively remote from iron-producing areas was assisted by the popular preference for cut nails of Swedish iron. The excellence of Champlain iron explains the prominence of the same manufacture in northern New York.

Inventions, an early start, and individual initiative explain the distribution of many minor metal manufactures. The extent to which these were concentrated in New England was remarkable. That section was as predominant in those branches, as were the Middle States in heavy metal-working, and this geographical specialization increased during the decade of great expansion that closed with 1860. But while New England excelled in those departments of manufacture that employed automatic machinery and refined manipulation, or created novel and ingenious devices, Pennsylvania led in industries that depended mainly on engineering and metallurgy.

In colonial times and immediately after the Revolution steel was made in Massachusetts, Rhode Island, and Connecticut, as well as in New York, New Jersey, and Pennsylvania. When the Constitution was adopted the United States probably produced 500 tons of steel annually, and two-thirds of this was made in the latter three States.[105] The census of 1810 reported 918 tons, of which 832 tons were made in Pennsylvania and New Jersey.[106] In 1831 the capacity of the 14 steel furnaces known to be in operation exceeded 1600 tons. Whether or not they manufactured that amount is unknown, and the distribution

[101] Swank, *Iron in All Ages*, 129; Morse, *Geography* (ed. 1812), 403; *Congressional Register*, I, 81; Bentley, *Diary*, I, 278, July 22, 1791; IV, 490, Dec. 11, 1817.

[102] *Pittsburgh Gazette*, Feb. 2, 1799; June 1, 1799; McLane, *Report on Manufactures*, II, 254.

[103] *The Crescent Iron Manufacturing Co., with Statistics of Other Manufactures at Wheeling.*

[104] U. S. Census 1860, *Manufactures*, cxcv.

[105] *Cf.* William Barton, "State of American Manufactures and Commerce," in *American Museum*, VII, 8, Appendix 4; *Congressional Register*, I, 69.

[106] *American State Papers, Finance*, II, 696; *cf.* Bruce, *Mineralogical Journal*, I, 5, Jan. 1810.

of their product is unspecified. The steel they made was inferior to that imported, and supplied about one-half of our consumption.[107] No authoritative general statistics of this industry were collected until 1860. It is known that in 1850 there were 13 steel works in Pennsylvania, with a product of 6000 tons.[108]

Although crucible steel had been made previously at Cincinnati, Pittsburgh, and Jersey City, and the first slab of cast steel rolled in this country had been shipped from Pittsburgh to the Deere Plow Works at Moline in 1846, at this time practically all domestic steel was made by the cementation process.[109] Great Britain and Germany still supplied us with tool and cutlery steel, and with the better grades used in other manufactures. By 1860 the amount annually made in America had nearly doubled, and almost one-third of the 12,000 tons we then produced was cast or rolled. More than half of the country's product was made at Pittsburgh, and more than one-fourth at Philadelphia. Two furnaces in New York and two in New Jersey accounted for the remainder.[110] New England, where one steel furnace continued in operation at Boston until after 1830,[111] had ceased to be a producer, although its factories and machine-shops probably employed more of this material than those of all the other States combined. This is partly accounted for by the fact that the manufactures peculiar to that section called for high-grade steel, and until the preceding decade this had been obtained almost entirely from abroad.

Manufactures which originally made subordinate use of metals and occupied locations accessible to other raw materials attracted metal-working industries to their vicinity. Clock-making, which at first employed wood, later supported the brass industry of the Naugatuck Valley. The carriage-builders of New Haven and its neighboring towns, who began to export their wares before an iron axle had been seen in New England, are to be credited with the fact that in 1860 two-thirds of all the axles forged in the Union, more than one-third of the springs, and a large share of the bolts were made in Connecticut.[112]

Sometimes one mind, fertile of ideas and favorably placed for their realization, influenced the location of important industries. When early in the century Eli Whitney, and his contemporary Simeon North, applied original thought to the manufacture of firearms, they initiated a movement that in 1860 caused more than half of the arms made in the United States to come from the lower Connecticut Valley. In 1830 Thaddeus Fairbanks, then a plowmaker at St. Johnsbury, Vermont, invented platform scales. It resulted that by 1860 his adopted

[107] New York Convention of 1831, *Journal, Reports of Committees*, 29.
[108] *Documents Relating to the Manufacture of Iron*, 106.
[109] Swank, *Iron in All Ages*, 390.
[110] U. S. Census 1860, *Manufactures*, cxcii–cxciv.
[111] New York Convention of 1831, *Journal, Reports of Committees*, 29.
[112] U. S. Census 1860, *Manufactures*, clxxxiv, cxciv, cxcvi.

State manufactured nearly one-half of all the scales made in America, and that most of these came from St. Johnsbury itself.[113]

To a less marked but an observable extent the personal factor in industrial localization is illustrated also by wire-drawing. Colonial mechanics had made wire with hand tools, and inferior card-wire was manufactured in Massachusetts immediately after the Revolution.[114] Apparently the industry was nearly dormant in 1809, though the following year the census reported wire-drawers in Massachusetts and Pennsylvania.[115] In 1812 there were two works in Connecticut and one at Pittsburgh, and a wire mill 200 feet long was opened at New York City.[116] Shortly before 1830 larger and more successful works were built at Beaver Falls, Pennsylvania.[117] In 1834 there were three factories in the United States, and their aggregate output was 4,500 tons.[118] Hitherto any tendency toward centralization was in the vicinity of primary iron manufactures. However, the principal market for card-wire was near the textile mills of New England. The latter year Ichabod Washburn, who had been operating a small wire mill in Worcester County since 1831, started a larger establishment at Worcester itself. His improvements in machinery and processes enabled him within a few years entirely to supplant British competitors, who until then had controlled the American market, and to supply wire for telegraph lines and other new uses that shortly afterwards greatly enlarged consumption.[119]

It is a tradition that at the Crystal Palace Exhibition, in 1851, American wire-making machinery was admittedly better than that used abroad.[120] About the same time the manufacture of wire nails began at New York, and John Roebling, a Prussian engineer long resident in the United States, started large wire-rope works at Trenton.[121] Meanwhile the Washburn plants—for there were several of the name engaged in iron manufactures at Worcester—perfected the manufacture of steel piano-wire, which hitherto had been the monopoly of a single English manufacturer. The dominance of this family of wire-workers was such that in 1860 Worcester made 58 per cent of all the wire manufactured in this country, and that of the 10,670 tons produced that year, 7,015 tons were credited to Massachusetts.[122]

Like clock-making, the manufacture of textile machinery changed within a few years from a wood-working to a metal-working industry.

[113] McLane, *Report on Manufactures*, I, 900; Bishop, *History of American Manufactures*, III, 376; U. S. Census 1860, *Manufactures*, cxcvi.

[114] Smith, *Fifty Years of Wire Drawing; Niles' Register*, II, 9, Mar. 7, 1812; *American Wool and Cotton Reporter*, XIII, 1246; Kittredge, *American Card Clothing Industry*, 15.

[115] *American State Papers, Finance*, II, 436, 696.

[116] *American State Papers, Finance*, II, 553; *Niles' Register*, III, 9, Sept. 5, 1812; *cf. id.* XII, 130, Apr. 26, 1817.

[117] *Niles' Register*, XXXVI, 66, Mar. 28, 1829.

[118] Smith, *Fifty Years of Wire Drawing.*

[119] *Worcester Spy*, Aug. 3, 1853.

[120] Bishop, *History of American Manufactures*, III, 286.

[121] Swank, *Iron in All Ages*, 450; Bishop, *History of American Manufactures*, II, 549.

[122] U. S. Census 1860, *Manufactures*, clxxxiv.

In 1791 there was a shop at Philadelphia making carding-machines and jennies for family use.[123] About the same time an English mechanic followed the same trade at New York.[124] During the next twenty years scattered notices appear of many such shops in different parts of the country. Arthur Scholfield for a time made cards and jennies for farmers and small manufacturers around Pittsfield.[124] During the War of 1812 a similar shop was in operation in the Genesee country, and before and after that period mechanics in Kentucky and Tennessee made gins, cards, and spinning machinery for families and small mills in the Ohio Valley.[125] These little machine works resembled cabinet or joinery shops. Even in early spinning mills the only metal parts, except wheel-bearings and gears already familiar to country millwrights, were a few brass castings from the nearest foundry and spindles forged by a local blacksmith and filed round at the factory bench.[126] Textile machinery was not made for general sale, and usually it was constructed in the building where it was to be installed. Occasionally there was an exception to the latter rule. Part of the machinery for the second cotton mill erected in Massachusetts was built to order at Paterson, and the drawing and roving cans were made by the proprietor with his own hands at a coppersmith shop in Boston.[127]

The manufacture of mill machinery became a separate industry about 1810, when David Wilkinson opened a shop for this purpose at Pawtucket and Alfred Jenks started similar works at Holmesburg, near Philadelphia.[128] Ten years later the Merrimac Company acquired part of the equipment and the patent rights owned by the machine-shop at the Waltham Cotton Mill. These Lowell works were designed at the outset to make textile machinery for outside parties, and in 1825 they became the property of the power company at that place. Thenceforth they were conducted as an independent business, and in 1845 were reorganized as an exclusively machine-making enterprise.[129] By the time Lowell was founded several mechanics in New England and the Middle States had shops containing power tools and sometimes small foundries where they made mill equipment. In 1830 there were nine such establishments at Worcester, making pickers, cards, jacks, broad and satinet looms, and napping, shearing, and brushing machines for the numerous woolen mills at this time being erected throughout New England and the neighboring States. The manufacture of card-

[123] *Pennsylvania Magazine of History*, VIII, 378, Dec. 1884.

[124] Bagnall, *Textile Industries*, 186; *cf. id.*, 225, 272; 264.

[125] *Buffalo Gazette*, Aug. 16, 1814; *Impartial Review and Cumberland Repository*, May 17, 1806; *Niles' Register*, IX, 35–36, Sept. 16, 1815; Howells, *Life in Ohio*, 8.

[126] *Cf.* Advertisement, *Worcester Spy*, Oct. 3, 1821.

[127] Bagnall, *Textile Industries*, 272–273.

[128] *Bagnall Papers*, III, 2343, 2346, 2354; Freedley, *Philadelphia and Its Manufactures*, 300; *cf.* Pease and Niles, *Gazetteer of Connecticut and Rhode Island*, 344. During the War of 1812, the New York manufactory conducted a large business in making textile machinery; Kittredge, *American Card Clothing Industry*, 45–46.

[129] *Bagnall Papers*, III, 2154–2156, 2343–2354; Hayes, *American Textile Machinery*, 300.

clothing likewise had begun to center in this city, where, as recently mentioned, it encouraged wire-drawing.[130] How far metal had been substituted for wood by this time is indicated in a return made by one of the three companies then making textile machinery at Paterson. The only materials it reported using were pig and bar iron, steel, blocked tin, zinc, copper, and lead, and the fuel employed was Lehigh, Lackawanna, and Virginia coal. Paterson was making cotton machinery for all parts of the country and had exported some to Mexico.[131] Three years earlier New England manufacturers had equipped a mill in Prussia.[132] There were two machine-making firms at Newcastle, Delaware, one of which dated back to 1808.[133]

Inventors and owners of patents exercised a large control over the development of this industry. Patent rights were an important asset of the Lowell machine-shops. Inventors erected works to make machinery embodying improvements they had perfected. This accounts for the Whitin Shops, established at Northbridge soon after 1830; it contributed to the ultimate success—after several earlier failures and reorganizations—of the Mason Works at Taunton; and in 1851 it caused the erection of the Crompton Loom Works at Worcester.[134]

During the industrial and technical upswing that occurred about the middle of the century, new machine-shops were established and old ones extended their plants. Before 1840 Hawes, Marvel, and Davol erected large works at Fall River.[135] The Lowell shops employed 500 to 1,200 men, and could complete machinery for a 5,000-spindle mill within four months.[136] In 1848 Lawrence was said to have the largest works in the country, employing 1,150 men.[137] Probably the most important plant for making textile-machinery outside of New England was that of Alfred Jenks and Sons, at Philadelphia. This firm controlled valuable patents and kept 400 men on its payrolls.[138]

In 1860 nearly one-half of the cotton and woolen machinery made in the United States came from Massachusetts, and more than one-half of that manufactured in Massachusetts was produced in Worcester County. That county alone made more textile-machinery than Rhode Island, which was the second State in this industry, and more than Maine, New Hampshire, New York, and New Jersey combined. However, Providence and Pawtucket rivaled Worcester itself as a

[130] McLane, *Report on Manufactures*, I, 570–575; *cf. Hunt's Merchants' Magazine*, XXII, 58, Jan. 1850.

[131] McLane, *Report on Manufactures*, II, 156–159.

[132] *Niles' Register*, XXXV, 136, Oct. 25, 1828.

[133] McLane, *Report on Manufactures*, II, 710–711.

[134] McLane, *Report on Manufactures*, I, 524; *Bagnall Papers*, III, 1806, 1823–1826; Bishop, *History of American Manufactures*, III, 271–272, 296–297.

[135] Fowler, *History of Fall River*, 33.

[136] *Hunt's Merchants' Magazine*, XVI, 357, Apr. 1847; *cf. id.*, 422–423.

[137] *Farmer and Mechanic*, II, 337, July 13, 1848.

[138] Freedley, *Philadelphia and Its Manufactures*, 427–432; Bishop, *History of American Manufactures*, III, 18–23.

machine-making center; their manufacturers controlled many of the valuable patents that insured the predominance of New England in this branch of industry and they were our principal makers of mules, speeders, and printing machinery.[139] Pennsylvania ranked third in this group of manufactures, and nearly all of its product came from Philadelphia. The total value of textile machinery made in the country was in the neighborhood of $5,000,000.[140]

In machine-making, as in other industries, specialization betokened high development. It characterized both localities and branches of manufacture. Providence, and indeed all New England, had become remarkable even before the Civil War for plants limited to making articles of a single kind. Inventions accelerated this phase of progress by causing shops to substitute special for general utility tools, and by centering new manufactures in establishments designed for their exclusive accommodation.

The effect of these influences upon industrial geography is illustrated by the localization of sewing-machine factories. These were of recent origin, required special power tools, and were operated under patent rights. Their output, insignificant in 1850, within ten years attained nearly the value of all the textile machinery made in the country. They had to manufacture many small castings and forgings graded to high standards of accuracy. The nature of their market caused them to give unusual attention to finish and ornamentation. They were the first factories to adorn machinery intended for practical use with japanning, gold and silver electroplating, and inlays of mother-of-pearl and other iridescent materials.[141] The expansion of this industry depended upon using automatic tools in place of manual skill, and technical necessities forced it to follow the mechanical and administrative precedents already adopted by makers of firearms, clocks, and similar articles. Almost inevitably, therefore, it located near these older branches of manufacturing. Market conditions alone would have drawn it farther west; and indeed they did attract factories to the vicinity of New York, which was their principal sales point and also the largest center for making clothing.

The Singer factory, which late in 1850 produced the first practical sewing-machine made in this country, removed to New York City after an initial and partly experimental period of two years in Boston.[142] In 1856 the Wheeler and Wilson Company, which since 1851 had made machines in a small way at Watertown, Connecticut, erected at Bridgeport the largest plant of this kind in the world.[143] The third large factory belonged to the Grover and Baker Company at Boston. These

[139] *Cf.* Bishop, *History of American Manufactures*, III, 318, *et seq.*
[140] U. S. Census 1860, *Manufactures*, clxxxviii.
[141] *Scientific American*, XVI, 301, May 11, 1867.
[142] *Bagnall Papers*, I, 31, 32, 37; Bishop, *History of American Manufactures*, III, 173–175.
[143] Bishop, *History of American Manufactures*, 357–358.

three cities made most of the sewing-machines manufactured in America. In round numbers, of 111,000 produced in 1860, New York and Connecticut each manufactured 24,000 and Massachusetts 22,000. The remainder were made in forty small establishments in nine different States, and mostly in Pennsylvania and Ohio.[144]

TOOLS AND HARDWARE

Despite the displacement of bench artisans by machine tools with the rise of power manufactures, more hand tools were used than ever, and the business of making them grew in extent and importance. Many tools used by American mechanics before the War of 1812 were of domestic manufacture, but they were made to order by local smiths or cutlers, and varied in size, shape, and workmanship according to the taste of the purchaser and the ability of the maker.[145] Workmen became accustomed to particular implements, and formed attachments—less common in these days of uniformity and standardization—for individual tools. Even the cutlers' and toolmakers' shops in larger towns manufactured mainly to order for mechanic customers. Axes were probably the first tools made in this country for general sale. To forge them economically required heavier hammers than were wielded by the arms of a blacksmith's helper, and a market for them existed in localities where iron workers had not yet penetrated. In 1795, we are told by a French traveler, most axes used in America were of home manufacture, though some were imported from Germany.[146] Before 1830 the characteristic American ax, with a soft iron head and cast-steel cutting edge, had been developed. In 1828 what was destined to become the largest ax factory in the world was established at Collinsville, Connecticut;[147] and a year later a maker at Preston, in the same State, was shipping cast-steel axes through Providence exporters to the South.[148] In 1831 a company at Douglas, Massachusetts, made annually 5,000 dozen axes and 3,000 dozen hatchets, and there were other manufacturers in Worcester County.[149]

Both mill-saws and hand-saws were made at Philadelphia by John Harper, in 1790.[150] A shop for their manufacture was established in the same city about twelve years later by William Rowland. The works of Henry Disston, also at Philadelphia, became before 1860 the largest saw-factory in the country and one of the largest in the world.[151] The

[144] U. S. Census 1860, *Manufactures*, clxxxix–cxc.

[145] *E.g.*, Camp, *History of New Britain*, 264 (note).

[146] La Rochefoucault, *Travels through North America*, I, 165; *cf.* Finch, *Notes on the United States*, quoted in *Documentary History of American Industrial Society*, VII, 58.

[147] *Great Industries of the United States*, 127.

[148] R. Hazard, *Manuscript Letter Book*, Dec. 12, 1829; July 30, 1830.

[149] McLane, *Report on Manufactures*, I, 510–511.

[150] *Columbian Centinel*, July 14, 1790. They were made at Trenton in 1734, advertisement, *American Weekly Mercury*, Sept. 5, 12, 1734, quoted in New Jersey, *Archives*, XI, 355; and at Philadelphia after 1769, advertisements, *Pennsylvania Gazette*, May 25, 1769, May 24, 1770, and supplement, June 18, 1772.

[151] Freedley, *Philadelphia and Its Manufactures*, 329–330; *Great Industries of the United States*, 372–377; *cf. Worcester Spy*, Sept. 15, 1810; *American State Papers, Finance*, II, 832.

screw auger, the twist gimlet, and the gimlet-pointed screw are all claimed as American inventions. John T. Pugh, who was an auger-maker in Philadelphia as early as 1774, is said to have made the first double-twist augers, which cleared their way as they bored.[152] These tools, as well as planes and cutlery, are reported in the census of 1810. In 1812 plane-irons and possibly other edge-tools of domestic make were carried in stock by Philadelphia merchants.[153] Probably these incipient industries declined at the close of the war, but they were reëstablished on a larger and more permanent basis before 1830. By that date there were cutlery and tool works at Worcester, Paterson, Philadelphia, Pittsburgh, and Chambersburg. The works at Chambersburg employed forty hands in making tools for carpenters, joiners, and curriers.[154] Pen-knives, pocket-knives, and table cutlery were made at Worcester, Northampton, Philadelphia, Pittsburgh, and Auburn.[155] Soon after 1830 these industries extended as far west as Cincinnati, where for some years saws and files were made from American cast steel.[156] File-making machinery was invented in the United States, and Providence became an important center of this industry.[157] After the invention of the twist gimlet, several shops for their manufacture were started in New England.[158] In 1860 that section produced about one-half the edge-tools and three-fourths the cutlery made in the United States. The largest cutlery factory was at Shelburne Falls, and other important works were located at Chicopee, Boston, and in New Haven County.[159]

It would be neither practicable nor illuminating to trace in detail the history of all the metal manufactures whose product—too varied for particular definition—is known as hardware. Their localization responded to the same influences that centered in New England other industries of this group, and their expansion and successive stages of organization followed the same order of development. Inventions helped to hold in these vicinities the manufacture of timepieces, locks, hinges, and numerous mechanical devices of the Yankee-notion type. Tradition has it that an Irish mechanic, who settled at Berlin shortly before the Revolution, is to be credited with the fact that for half a century Connecticut made most of the tinware produced in this

[152] Smith, *Fifty Years of Wire Drawing*, 19; Mease, quoted by MacFarlane, *Manufacturing in Philadelphia, 1683–1912*, 52–56.

[153] *Niles' Register*, I, 390, Jan. 25, 1812.

[154] *Niles' Register*, XLI, 148, Oct. 22, 1831; Hazard, *Register of Pennsylvania*, VI, 32, July 10, 1830; VIII, 303, Nov. 5, 1831; IX, 383, June 16, 1832.

[155] Hazard, *Register of Pennsylvania*, VII, 415, June 25, 1831; *Niles' Register*, XXII, 321, July 20, 1822; XXXIII, 157, Nov. 3, 1827; XXXVII, 7, Aug. 29, 1829; XL, 282–283, June 18, 1831; XL, 394, July 30, 1831; XLIII, 43, Sept. 15, 1832; *Hunt's Merchants' Magazine*, XIV, 157, Feb. 1846.

[156] Swank, *Iron in All Ages*, 386–387.

[157] *Hunt's Merchants' Magazine*, XVIII, 228, Feb. 1848; *Farmer and Mechanic*, II, 32, Jan. 20, 1848; *Niles' Register*, I, 390, Jan. 25, 1812; Providence, *Census of 1855*, p. 46.

[158] *Niles' Register*, XLIV, 403, Aug. 17, 1833.

[159] U. S. Census 1860, *Manufactures*, cxciii; *cf.* also Wallis, *Special Report on New York Industrial Exhibition of 1853*, 40.

greatest of tin-using countries.[160] But like the Welsh ancestor of shoemaking at Lynn, he planted the seeds of his art in a locality favored by handy labor and by peculiar marketing facilities. Already Connecticut peddlers were trading cheese, socks, mittens, and wooden ware with the French Canadians to the north, the Dutch to the west, and possibly even on the confines of the Indian country, as their forefathers and contemporaries by easier sea routes peddled the colony's produce to the Spaniards of the West Indies and to the rice and tobacco planters of the South. These itinerant vendors added metal wares to their stock, and by the end of the century the tin-peddler's cart was a familiar institution from the St. Lawrence to the Ohio and the Potomac. In 1807 one tinsmith employed 60 hands at Berlin during the summer, removing each winter to Philadelphia, where he continued to ply his trade with uninterrupted access to southern markets.[161]

Peddlers were not the only distributors at the service of New England's infant metal industries. The week that the Declaration of Independence was signed, a New Jersey storekeeper advertised the theft of "two or three hundred pair of brass sleeve buttons, New England make."[162] When the Federal Government was organized, a New Haven firm was manufacturing annually nearly 2,000 gross of metal and metal-rimmed cloth buttons, and was beginning to make horn and japanned paper buttons. The proprietors made their own alloys, designed their own machines, and apparently made their own plate metal.[163] Later this industry was organized partly on a cottage basis, only to yield eventually to the centralizing influence of automatic machinery.[164] Before the middle of the century the daily output of single factories about equaled the annual output of the New Haven manufacturers just mentioned.[165] In 1860 Connecticut made 55 per cent of all the buttons produced in the country.

Returning to general hardware, the manufacture of which became specialized somewhat later than that of tin pails and brass buttons, Connecticut in 1860 produced two-fifths of all made in the United States.[166] How early that State attained a lead in this branch of iron-working is unknown. At one time Philadelphia was regarded as the principal center of this industry. The excellence of Salisbury iron for small castings and forgings may account in part for the growing predominance of Connecticut. As early as 1831 a New London manufacturer estimated that 300,000 coffee-mills were made annually in

[160] Dwight, *Travels in New England and New York*, II, 53–55; reprinted also in Callender, *Economic History of the United States*, 302–303; Camp, *History of New Britain*, 266–268.

[161] Kendall, *Travels in the United States*, I, 128–129; *American State Papers, Finance*, II, 429.

[162] Advertisement, *Pennsylvania Journal and Weekly Advertiser*, July 10, 1776, quoted in New Jersey, *Archives*, Ser. II, vol. I, 140–141.

[163] Letters of John Mix, New Haven, Sept. 30, Oct. 5, 7, 8, 1791, in *Hamilton Papers*, Library of Congress.

[164] *American Journal and Mirror of the Patent Office*, I, 453, July-Sept. 1828.

[165] *Hunt's Merchants' Magazine*, XIV, 156, Feb. 1846.

[166] U. S. Census 1860, *Manufactures*, CXC.

that State. He himself produced 40,000, besides corn-mills, door-latches, and shutter-fasteners. His business had been established in 1818.[167] The first hardware store to deal mainly in American goods is said to have been opened at New York in 1827. At this time a very large part of the tools and builders' hardware used in this country came from Great Britain.[168] In 1849 it was estimated that about half of the stocks of hardware stores consisted of domestic manufactures, mostly of New England origin. During the previous decade the importation of screws, butt hinges, and several other articles of shelf hardware had almost entirely ceased.[169] These were manufactured extensively at Providence, and also at Pittsburgh and Cincinnati. One of the largest plants engaged in the business was at the latter city.[170]

Industries of this class used various materials, whose working formed separate branches of operation. In America these different processes were united at single establishments, while in Europe they were divided among several shops and trades. Nevertheless there were limits to this concentration of processes, and interdependent metal industries appeared in our leading manufacturing districts. Indeed, this correlation extended even further, as in case of the Pittsburgh potteries engaged in making door-knobs for local lock factories.[171]

COPPER AND BRASS

During the first half of the century copper refining and rolling, with which was associated the manufacture of other commercial shapes, was confined mainly to the vicinity of ship-building ports, like Boston, New York, and Baltimore, because the plants thus engaged used imported material, and their bulkier products were employed to fasten and sheath vessels. But the manufacture of brass and other alloys had no such maritime affiliations, and its principal center was in the neighborhood of the makers of buttons, clocks, table cutlery, cheap jewelry, toys, plated goods, and fancy hardware, who within the memory of a single generation built up so many active industries in southern New England. In 1802 a firm at Waterbury, where buckles and buttons had been manufactured on a small scale since 1750, began to make brass by the direct fusion of copper and zinc, and to roll their product at a Litchfield iron mill. They worked the sheets thus produced into die-stamped buttons, which during the next two decades were replacing the cast buttons of pewter and brass previously in vogue. Between 1820 and 1830 competing firms entered the field at Waterbury, and improved machinery and skilled workmen were procured from

[167] McLane, *Report on Manufactures*, I, 1038; II, 248.
[168] Bishop, *History of American Manufactures*, II, 387 (note).
[169] *Reports of the Secretary of the Treasury*, VII, 566–572.
[170] Providence Census 1855, 49; Bishop, *History of American Manufactures*, III, 303; Wallis, *Special Report on New York Industrial Exhibition of 1853*, 44.
[171] Wallis, *Special Report on New York Industrial Exhibition of 1853*, 60.

England. Rolled brass thereupon became a distinctive product of this town and its vicinity, which remained the only important producer of that article in America until after the Civil War. Wood for annealing was abundant, water-power was available, land was poor and labor cheap, transportation charges were not prohibitive, and the people possessed the kind of grit required for industrial pioneering.

Secondary manufactures employing brass mill products multiplied. The first firms used most of their sheets for buttons; but in 1830 a company was organized to roll brass and to draw wire exclusively for the general market. However, foreign competition made this too precarious, and the firm later devoted part of its capital to making tubing hooks and eyes, and kindred articles. After 1835 rolled-brass hinges, cabinet hardware, and clock-works speedily took up the surplus plates and created a demand for still larger production. Silver-plating opened the way to manufacturing die-stamped spoons, forks, casters, and table services. In 1851, at Waterbury, the invention of the metal-spinning process enlarged the use of brass for kitchen utensils and similar articles, which previously had been cast or hammered. Meanwhile plants were erected elsewhere in the Naugatuck Valley, the brass town of Ansonia was founded, and pins began to be manufactured. The control of patents caused the latter business to be monopolized by two companies at Derby and Waterbury, and in 1860 three-fourths of the pins made in America came from Connecticut. The growing demand for lamps added another department to the brass-working industries of the neighborhood, and the new art of photography, then confined to printing directly upon metal, created a novel and unanticipated demand for daguerreotype plates. During this period of expansion the business men of this region alone possessed the experience, and their workmen alone possessed the skill, upon which successful manufactures of this character must be founded. These conditions, in spite of alluring profits, prevented domestic competition from arising in other parts of the country. Probably no other manufacture of equal volume was so strictly localized, for in 1860 Connecticut produced 97 per cent of the rolled brass and German silver made in America, and nearly all of this came from New Haven County.[172]

On the other hand, brass-founding, which was a much older industry in America than rolling, was widely distributed, partly as an independent manufacture and partly ancillary to other branches of metal-working. New York and Pennsylvania led in value of product, but it is doubtful whether there was any other district in 1831 where so much relative attention was given to this industry as the Connecticut township of Berlin, which had 9 brass factories and employed 100 men and boys making house-bells, sleigh-bells, andirons,

[172] Lathrop, *The Brass Industry in Connecticut;* U. S. Census 1860, *Manufactures.* Early manufactures of britannia ware were mostly in eastern Massachusetts; *cf.* Bentley, *Diary,* IV, 237, Feb. 25, 1814.

tongs, ash-shovels, and similar household conveniences. Five other establishments in the same town employed 200 operatives, three-fourths of whom were women, in the manufacture of hooks and eyes, cloak-clasps, and other articles of brass and plated ware.[173]

Metal trades that served mainly urban markets centered in larger cities. Between 1830 and 1850 the manufacture of gas-fixtures, chandeliers, and lamps acquired importance. According to the census of 1860, Philadelphia produced nearly two-thirds of those made in America. In 1854 the largest factory in that city employed 700 operatives, under an elaborate organization and a scientific control of processes that elicited comment from foreign visitors. A private telegraph connected the separate buildings of this plant. The use of gas, having necessitated great accuracy of fitting, appears to have encouraged increasing precision in all departments of manufacture. Metal parts, mostly of brass, were cast, rolled, or spun. Design and decoration influenced sales sufficiently to make the art aspect of this manufacture important. Among the varied trades included in its complex of factory processes was also glass-cutting, though the making of glass itself appears to have been left to outside producers.[174]

JEWELRY AND SILVERWARE

Another metal-working trade of urban affiliations was the manufacture of jewelry, which was concentrated at Philadelphia, Newark, New York, and Providence. Connecticut made most of the silver-plated and britannia ware produced in America, though this industry was not so narrowly localized as brass-rolling, with which it was directly associated. Electroplating was first developed in this country at Philadelphia, shortly before 1840, and that city continued to be a principal site of this manufacture.[175] Pennsylvania makers, following the precedent of their long-established silver-smithing industry, made ware of elaborate design and heavy quality. From Philadelphia the art was quickly introduced into New England, where earlier plating processes already were familiar and the field was prepared for its rapid extension.[176] As early as 1810 Connecticut was the largest producer of brass jewelry and gilt and plated ware in this country,[177] and in 1850 one of the principal factories for these goods was at Waterbury. The silver-plating works in New England, as a rule, made articles of a cheaper grade than those manufactured in the Central States.

It would be difficult to say precisely when goldsmiths' shops, of which there were several in colonial towns before the Revolution, began to manufacture silverware and jewelry for the general market. Phila-

[173] McLane, *Report on Manufactures*, I, 990, 1012, 1034.
[174] Wallis, *Special Report on New York Industrial Exhibition of 1853*, 47–50.
[175] Freedley, *Philadelphia and Its Manufactures*, 349–350.
[176] Wallis, *Special Report on New York Industrial Exhibition of 1853*, 54–55.
[177] *American State Papers, Finance*, II, 698.

delphia mustered 38 master and journeymen goldsmiths for the Federal procession,[178] and according to an official report, in 1790, which was a year of poor employment, the craftsmen of Providence made 80 dozen silver spoons, 100 pairs of silver buckles, and 1,400 pairs of silver-plated buckles.[179] About this time a manufacturing jeweler, who made rings, bracelets, and chains of solid gold, is said to have established that industry at Newark, where it later developed into an important business. Soon after the turn of the century the city of Providence began to manufacture gold-filled jewelry and silver plate. In 1805 there were four firms making jewelry in that city, and five years later the number of workmen employed at this trade was 100; that number trebled during the next ten years, and it increased to 1,400 by the middle of the century.[180] In 1831 the neighboring Massachusetts town of Attleboro had four jewelry shops, employing altogether about 100 operatives. These establishments made gilt and plated articles.[181] By the middle of the century the industry at that place was entirely on a factory basis, one plant occupying a building 240 feet long and using both water and steam power.[182] Metal buttons, whose manufacture was affiliated with that of cheap jewelry, were manufactured extensively in the same vicinity.

New England specialized in less costly articles than those made at New York, Newark, and Philadelphia. In these three cities the metal in jewelry represented one-half of its final value, but in Rhode Island it constituted only two-fifths and in Massachusetts less than one-third of that amount. New York City early became our principal gem market, and, partly for that reason, in 1860 led in the value of jewelry manufactured. More people were employed in this industry in Rhode Island. Discoveries of gold and silver in the West made the precious metals more abundant than formerly, and their use for service and ornament rapidly extended. As the market became broader, the relative advantage of the system of manufacture pursued in New England increased. Handicrafts, and methods of production that follow the precedent of handicrafts, serve best an aristocracy of consumers, while factories serve best the consumption of a democracy. The secret of the prosperity of metal manufacturing in New England lies in its adaptation to this popular market, which during these years was growing more rapidly than any other or than at any previous period in history.

[178] *American Museum*, v, 4, 68; Ebelings, *Erdbeschreibung von Amerika*, iv, 380 (note).

[179] *Report of Committee on Manufactures in Providence*, signed by William Richmond, Chairman, Oct. 10, 1791, in *Hamilton Papers*, Library of Congress.

[180] Providence Census 1855, 43; Bishop, *History of American Manufactures*, ii, 216; *Niles' Register*, xxxii, 56, Sept. 22, 1827; lvii, 261, June 22, 1839; Buckingham, *America*, iii, 488.

[181] McLane, *Report on Manufactures*, i, 200–201.

[182] Sanitary Commission of Massachusetts, *Report*, 1850 466.

CHAPTER XX

TEXTILES

Flax, 529. Hemp, 532. Cotton, 533. Wool and mixed cloths, 560. Silk, 575.

While metal manufactures best illustrate the effect of the industrial revolution upon volume of production, textile industries more clearly reveal its influence upon the organization and the social aspects of manufacturing. The transfer of spinning and weaving in America from homes to factories was a greater change than their transfer from workshops to factories in Great Britain. No other industrial arts were so universally practiced by our people and no other were so suddenly taken from their hands. In spite of the occasional persistence of homespun in isolated districts until within recent memory, the short period between 1810 and 1830 saw the center of gravity of textile manufactures shift from the fireside to the factory. Not only did the household lose a traditional employment, but simultaneously industry —for the first time in our history—began to disintegrate the family. Hitherto sailors had been about the only people who left their homes in order to maintain them; now women were withdrawn from the domestic circle to recruit the mobile forces of manufacturing labor. This attacked not only the economic but also the social integrity of the family, and was the first evidence that new methods of production were destined profoundly to modify the constitution of society.

FLAX

Although cotton and wool have been our most important textile manufactures during the factory period, flax held the primacy during the régime of homespun. In 1810 only 2 per cent of the cloth made in America was produced in factories, but the use of mill-yarn had already increased the relative amount of cotton woven in households. Notwithstanding the latter fact, flax still outranked cotton in the ratio of 4 to 3, and wool in the proportion of more than 2 to 1, among the fabrics whose composition is sufficiently specified by the census for classification.[1] The subsequent change from flax to cotton was due in part to the speedier improvement of cotton machinery, and in part to a specialization in agriculture analogous to that which was transforming manu-

[1] Omitting mixed cloths, which usually had a flax warp; *American State Papers, Finance*, II, 690–691.

factures. While flax remained an item of general farming, cotton developed into a staple crop. Machinery hastened that transition, but was itself partly a response to the changing production of raw materials.

Unclassified fabrics, mostly of mixed texture, formed more than half the output of American looms in 1810, a proportion that decreased as factory goods displaced homespun. Growing specialization of products consulted technical convenience and was also an incident of standardization, which became a necessary price-measuring device when cloth was made for general sale. The order in which different classes of fabrics were produced depended partly upon mechanical facilities and operative skill, and partly upon the nature of the market. As a rule, coarse yarns and cloths preceded those of finer number and texture, and goods intended for commercial uses preceded those destined for personal consumption.

The most elementary employment of textile fibers is in rope-making, which was pursued successfully in the colonies and thereafter enjoyed the happy prosperity which has no history. Allied to this industry in materials, processes, and markets, is the manufacture of canvas and of bagging. These fabrics and cordage were sometimes made at the same establishment. Shortly after the Revolution several factories for making duck were started in New England. Canvas was in demand at shipyards, and the flax or hemp from which it was made was grown extensively in the Merrimac and Connecticut valleys. The largest of these enterprises was the sailcloth manufactory erected at Boston in 1788, which employed 200 men and 50 women, and attained a maximum product of 120,000 yards per annum. It sold goods as far south as Baltimore.[2] Similar factories, although on a smaller scale, were started at Exeter, Haverhill, Salem, Yarmouth, Stratford, Stamford, and Springfield.[3] The one of Sprinfield used Connecticut Valley hemp.[4] None of these establishments employed power machinery, although some of them possessed labor-saving devices. They were encouraged by State bounties on their product, and their prosperity seems to have terminated in 1795, when these expired.[5] Flax and hemp were expensive, and in some instances were imported. Lack of steady labor and prejudice against domestic canvas, although it was said to be

[2] Inclosure with letter of Sam Breek, Sept. 3, 1791, in *Hamilton Papers*, Library of Congress; Massachusetts Historical Society, *Collections*, 1794, Ser. I, vol. III, 279; *Columbian Centinel*, July 14, 1790; Jan. 19, 1791; *Massachusetts Magazine*, III, 132, Feb. 1791; Washington, *Diary*, 36–37, Oct. 28, 1789; Bagnall, *Textile Industries*, 112–116.

[3] Winterbotham, *View of the United States*, II, 166; Brissot, *Voyage*, I, 128 (note); La Rochefoucault, *Travels through North America*, I, 477; II, 200; Massachusetts Historical Society, *Collections*, 1795, Ser. I, vol. IV, 94; Washington, *Diary*, 22, Oct. 17, 1789; 46, Nov. 4, 1789; Bagnall, *Textile Industries*, 88; Letter of James Davenport, Stamford, Sept. 16, 1791; in *Hamilton Papers*, Library of Congress; *Columbian Centinel*, May 21, 1791; Bentley, *Diary*, I, 149–150, Feb. 26, 1790; I, 186, July 17, 1790; I, 198, Sept. 22, 1790; I, 202, Sept. 29, 1790; I, 350, Feb. 15, 1792; II, 392, Sept. 14, 1801; *cf.* Crèvecœur, *Voyage dans la Haute Pensylvanie*, I, 172.

[4] La Rochefoucault, *Travels through North America*, I, 519; II, 209.

[5] Bagnall, *Textile Industries*, 324.

better than that brought from abroad, were other obstacles to permanent success. About the date the New England factories closed, a mill was started at Philadelphia to spin and weave canvas by power. Its existence terminated with the death of the owner, two years later.[6] However, before the War of 1812 the manufacture of canvas was resumed in New England and at Philadelphia,[7] and in 1820 it was inaugurated at Paterson, where a linen factory had been in operation since 1814. Naval contracts, given to the latter mill to insure a domestic supply in case of war, account for the beginning and the continuation of sailcloth manufactures in that city. Cotton duck was made at the same place, but was too combustible to be used on war-vessels.[8]

The history of the other flax manufactures in America is as brief as the extent of the industry was limited. Soon after 1790 several coarse-linen manufactories, some of which spun by power, were established both in the East and in the Ohio Valley.[9] They indicated the trend of the still vigorous household flax industry toward mill organization before that movement was halted by the complete ascendency of cotton in the factory-cloth market. The Gallatin Report, in 1810, records only a factory in New York and two near Philadelphia, one of which spun cotton as well as flax. These could manufacture annually about 500,000 yards of canvas and coarse linen.[10] New York may have continued this manufacture at small mills almost without interruption. Canvas weaving was an early industry at Hudson; a linen mill at Schaghticoke continued running for several years after the War of 1812;[10] a factory of some pretensions was started at New York City in 1827;[11] and in 1860 that State and Massachusetts contained the only linen mills reported in the census.[12]

Under the tariff of 1824 some attempt was made to manufacture linen thread, yarns, and finer fabrics. An English firm engaged in the former business at Philadelphia and a mill at Pittsburgh made toweling, table-cloths, and damask.[13] In 1827 there were said to be 7 flax mills in America, with a total of 2620 spindles.[14] Probably most of these spun thread and duck yarns. These nascent undertakings used imported flax mainly, and disappeared soon after 1828, when a high duty was imposed on that commodity.

[6] Bagnall, *Textile Industries*, 222–226.

[7] Bagnall, *Textile Industries*, 557; *American State Papers, Finance*, II, 428.

[8] *American State Papers, Finance*, IV, 100; V, 834; *Niles' Register*, XX, 307, July 14, 1821; XXXI, 116, Oct. 21, 1826; *cf.* McLane, *Report on Manufacturers*, II, 141; *Farmer and Mechanic*, II, 262, June 1, 1848.

[9] *E.g.*, advertisement, *Kentucky Gazette*, June 2, 1792; Jan. 12, 1793; *Impartial Review and Cumberland Repository*, June 10, 1807 (water-spinning); Melish, *Travels through the United States*, I, 166, Sept. 8, 1806.

[10] *American State Papers, Finance*, II, 427; IV, 80.

[11] Harrisburg Convention, *Proceedings*, 63.

[12] U. S. Census 1860, *Manufactures*, ciii, cxi.

[13] *American State Papers, Finance*, V, 1038–1039; Hazard, *Register of Pennsylvania*, III, 15, Jan. 3, 1829, 144, Feb. 28, 1829; *Niles' Register*, XXXV, 281–282, Dec. 27, 1828.

[14] *Niles' Register*, XXXII, 391, Aug. 11, 1827; *cf.* also *American State Papers, Finance*, V, 832–836.

A more permanent revival of these manufactures occurred about the middle of the century. In 1846 what was destined to become the largest linen-mill in America was started at Dudley, Massachusetts. At this time there were 5 flax factories known to be in operation.[15] Six years later the American Linen Company erected a factory with 10,500 flax spindles at Fall River.[16] For a time the products of this company were in large demand, but a change in fashion lessened sales and caused it to substitute cotton for flax machinery in part and to limit its manufactures of the latter to simpler fabrics. The Willimantic Linen Company, organized in Connecticut in 1854, after spinning flax for three years, diverted its capital to making cotton thread.[17]

During the ten years ending with 1855 the value of linens made in Massachusetts rose from practically nothing to nearly $1,500,000.[18] In 1850 the State had 9 mills and 3984 spindles employed in this branch of manufacture.[19] By 1860 the number of factories had fallen to 3 and the product to $515,000. In the whole country, apart from homespuns, only $700,000 worth of linen goods was made.[20]

HEMP

Hemp manufactures had a thriftier growth and steadier prosperity. Besides cordage, they included most of the bagging made in this country before the Civil War. Flax was used to some extent for the latter fabric and it divided with sailcloth the attention of the factories at Paterson. But the principal bagging and bale-cloth manufactures of the Union were in the Ohio Valley, and chiefly in Kentucky. One of the earliest industries of that State was the manufacture of these coarse fabrics. In 1796 a $10,000 lottery was granted for a duck and linen factory at Georgetown.[21] Ten years later a hemp-spinning mill was in operation at Madison.[22] By 1809 Kentucky was said to supply most of the baling used in the cotton country.[23] The census of 1810 credited the State with over 450,000 yards of this cloth.[24] A manufacturer at Lexington shipped bagging to Georgia for the crops of 1816 and 1817;[25] and ten years later the annual product of that city alone was said to be 1,000,000 yards.[26] Towards the middle of the century Missouri became a competitor of Kentucky in hemp manufactures, and of the 9,540,000 yards of bagging reported by the census of 1860, the latter State made 5,750,000 and its western rival 3,680,000.[27]

[15] *Sen. Doc.* 72, 62d Cong., 1st sess., Part III, 1808.
[16] Peck and Earl, *Fall River and Its Industries*, 63; Bishop, *History of American Manufactures*, 274; *Hunt's Merchants' Magazine*, XXXII, 255, Feb. 1855.
[17] *Bagnall Papers*, III, 1724–1725.
[18] Massachusetts, *Statistics of Industry*, 1845 and 1855.
[19] *Hunt's Merchants' Magazine*, XXIV, 117, Jan. 1851.
[20] U. S. Census 1860, *Manufactures*, cxi.
[21] *Kentucky Gazette*, Apr. 9, 1796; *cf.* Moore, *A Study of the Hemp Industry of Kentucky*, 43.
[22] Advertisement, *Kentucky Gazette*, Sept. 5, 1809.
[23] *American State Papers, Finance*, II, 367; Appendix X.
[24] *American State Papers, Finance*, II, 691.
[25] James Weir, *Manuscript Letter Book*, II, 2, 22; *cf.* 343, preceding.
[26] *Niles' Register*, XXXII, 267, June 16, 1827; Kayser, *Commercial Directory*, 1822, 54–55; *American State Papers, Finance*, V, 832–833, 836 and Appendix XII.
[27] U. S. Census 1860, *Manufactures*, cxix.

COTTON

A complete history of the cotton manufactures of the United States would embrace more detail than that of any other industry. Geographically these manufactures occupied four principal areas, of which three were broadly similar in the character of their establishments and the fourth was the scene of almost a distinct development. This fourth area was New England, which differed from other parts of the country in the size and organization of its cotton factories and in the products they chiefly manufactured. New England itself, as we have remarked in earlier chapters, was divided into smaller manufacturing districts, each of which had an individual character. In the Middle States, the South, and the West, cotton factories shared in common many features of organization and methods of production, but there were some establishments in these regions—especially as the period before 1860 drew to a close—that either copied or developed independently policies and plants similar to those of the New England States. Behind these geographical variations, though in ultimate analysis depending on them, lay the different histories of cotton manufactures in each section of the Union.

At the close of the Revolution little precise information existed in America regarding the new textile machinery for some time successfully used in Great Britain. In 1786 and 1787 Massachusetts twice granted public aid to assist in procuring these inventions.[28] A private society at Philadelphia, which previously had cylinder cards and jennies, made efforts in the same direction.[29] The British Government took every precaution to prevent the new machinery, or a practical knowledge of it, from leaving that country, and British agents even shipped back to England such machines as they could acquire in the United States.[30] Nevertheless our manufacturers, within two or three years from the time their interest was attracted seriously to this object, obtained all the essential textile improvements then known abroad.

Yet this was for them a period of experiment and of partial success obtained through multiplied failure. Before 1800 more than a score of small cotton manufactories were started in New England and the Central States, but by that time less than a third of them survived. These pioneer undertakings were of two kinds, jenny mills and Arkwright mills, which differed from each other in power, machinery, materials, and products. Jenny mills were run by hand or by horse power. One at Worcester and possibly another in South Carolina, of

[28] White, *Slater*, 294–298.

[29] *American Museum*, II, 507; III, 285; *cf.* Bagnall, *Textile Industries*, 75–76.

[30] Historical Manuscripts Commission, *Report*, in American Historical Association, *Report for 1896*; Phineas Bond, *Letter*, Nov. 20, 1787, to Lord Carmarthan, with affidavits re shipping back to England three cotton-spinning machines and one cotton-carding engine. *Cf. American Museum*, IV, 342. This probably occasioned the Pennsylvania law of March 29, 1788, prohibiting the exportation of machinery from the State; Pennsylvania, *Statutes at Large*, XIII, 58.

which we have uncertain knowledge, were driven by water.[31] Such mills spun cotton only into weft, and used flax for warps. They wove relatively more of their yarn into cloth than Arkwright mills, and looms formed an important part of their equipment. The latter were employed mainly on corduroys and jeans, fabrics approaching duck or denim in coarseness of texture, which were used for laborers' clothing and served the same demand in the North as negro cloth in the South. The first of these jenny factories started at Philadelphia in 1787, as a revival of an earlier enterprise, and closed in 1790, when its building was destroyed by fire.[32] A more extensive mill at Beverly also opened in 1787.[33] There is record of others at Wrentham, Newport, Providence, Norwich, Bethlehem in Connecticut, New York, Brooklyn and possibly at Portsmouth and Baltimore.[34] None of them, except the factory at Beverly, had more than a transient history, though some of them were precursors of Arkwright mills. The latest of these establishments dates from 1794, so that seven years covers the brief period of their promotion. With one exception they ceased operation before 1800; that exception was the Beverly mill, which was aided with public funds, introduced mechanical improvements, including a "self-feeding jenny," possibly upon Crompton's principles, and after 1793 specialized in the manufacture of bed-ticking, of which it made 24,000 yards annually.[35] By confining its product to a standard fabric this mill anticipated a later policy of New England manufacturers. American mills succeeded first with cloth that was not used for apparel, and therefore escaped the prejudice in favor of foreign goods, whose superior pattern and finish were sought particularly for clothing. Possibly purchasers had reason to question even the substantial quality of some early domestics, for one mill assured the public by advertisement that its tickings would "hold feathers."[36] The Beverly factory, which remained the largest in the country even after some Arkwright mills had been established, continued in operation until 1807, when the embargo shut up the shipping upon which Salem and Newbury-

[31] Bagnall, *Textile Industries*, 127–131; *Worcester Spy*, Apr. 30, Dec. 10, 1789; May 27, 1790; *American Museum*, VIII, Appendix IV, 11, July 1, 1790; *cf.* letter in *Charleston Courier*, Feb. 26, 1845; Drayton, *View of South Carolina*, 149; Lambert, *Travels through Canada and the United States*, 211.

[32] Bagnall, *Textile Industries*, 78–79, *American Museum*, IV, 48–49; 342, 405–408; VII, Appendix IV, 30; Arkwright machines may have been used at this time, *American Museum*, VII, 228; *cf. Hardie's Tablet*, 189; cited in Ebelings, *Erdbeschreibung von Amerika*, IV, 397.

[33] Bagnall, *Textile Industries*, 89–100; Essex Institute, *Historical Collections* XXXIII, 1–21; Washington, *Diary*, 40–41, Oct. 30, 1789; Letter of George Cabot, Sept. 6, 1791, in *Hamilton Papers*, Library of Congress; Bentley, *Diary*, I, 200–201, Sept. 24, 1790.

[34] Wrentham: Bagnall, *Textile Industries*, 176. Newport: Bagnall, *Textile Industries*, 169; Rhode Island Society for Encouragement of Domestic Industries, *Transactions*, 1861, 94, 97–98. Providence: White, *Slater* 64–65, 84–85; Rhode Island Society for Encouragement of Domestic Industries, *Transactions*, 1861, 101–102. Norwich: Bagnall, *Textile Industries*, 168; Letter of Christopher Leffingwell, Aug. 30, 1791, in *Hamilton Papers*, Library of Congress. Bethlehem: Bagnall, *Textile Industries*, 197–198. New York: *American Museum*, VII, Appendix IV, 27, Mar. 3, 1790. Brooklyn: Wansey, *Excursion to the United States*, 70; *cf.* also Batchelder, *Cotton Manufactures*, 37–39; Baltimore: *Maryland Journal*, Apr. 2, 1790.

[35] Bentley, *Diary*, II, 2, Jan. 16, 1793; II, 113, Nov. 24, 1794; II, 236, Sept. 9, 1797.

[36] Bagnall, *Textile Industries*, 168.

port depended for prosperity, and a crisis swept over Essex County that closed industrial as well as mercantile establishments.[37]

Seventeen years before this date Samuel Slater, a young Englishman twenty-two years old, who had learned cotton-spinning at Balper, who had been attracted to America by advertisements offering a reward for improved cotton machinery, and who had spent a short time in the service of the New York Manufacturing Company, built at Pawtucket the first successful Arkwright mill in this country. His spindles, driven by water, began producing during the winter of 1790–91, and spun the first cotton warps made this side of the Atlantic.[38] Two or three years later similar machinery was put in operation at Wrentham, New York City, and New Haven.[39] This was followed by mills at Warwick, East Hartford, and Paterson, in 1794; at Suffield and Wilmington, in 1795; at Philadelphia, in 1796; and at Reheboth, in 1799.[40] For various reasons the mills at New York, Paterson, Philadelphia, and Wilmington closed before the end of the century; so that in 1800 the factory at Beverly, and 7 Arkwright mills, 4 within a few miles of Providence and 3 in Connecticut, represented the organized cotton industry of the United States. They probably operated less than 2000 spindles, and annually spun between 50,000 and 100,000 pounds of imported cotton into yarn for general sale. The cotton mill now bore the same relation to the household loom that the water-driven wool-card was beginning to bear to the household spinning-wheel.

Modest as they were, these humble beginnings announced the definite acquisition of a new art. No more jenny mills were started in the industrial part of the country, though for more than a decade longer they multiplied as a temporary form of shop and plantation manufactures throughout the South and West.[41]

Already New England gave evidence of being the probable future center of the cotton industry. It was the home of nearly all the operatives trained in this country, and attracted many British spinners who, hearing of Slater's success, sought to better their fortunes in America. Between 1800 and 1804 the number of mills in Rhode Island, Massachusetts, and Connecticut more than doubled. The latter year men who had learned the business under Slater founded, at New Ipswich,

[37] Bagnall, *Textile Industries*, 98.

[38] The exact date is uncertain, White, *Slater*, 85; Staples, *Annals of Providence*, 625; *cf.*, however, Appendix VII.

[39] Bagnall, *Textile Industries*, 172, 185, 189–190.

[40] Bagnall, *Textile Industries*, 213–215, 241–242, 181, 244, 250, 222, 251; *cf.* also La Rochefoucault, *Travels through North America*, I, 505, 523; II, 148, 255; Barber and Howe, *Historical Collection of New Jersey*, 409; *Farmer and Mechanic*, I, 430, Sept. 2, 1847; *Maryland Journal*, Feb. 10, 1797; Ebelings, *Erdbeschreibung von Amerika*, V, 80; McLane, *Report on Manufactures*, II, 846; Batchelder, *Cotton Manufactures*, 34; Fuller, *History of the Town of Warwick*, 187–191.

[41] Jefferson, *Writings*, XIII, 170–171, letter to General Kosciusko, June 28, 1812; XIII, 207–208, letter to John Melish, Jan. 13, 1813; Melish, *Travels through the United States*, I, 380, 381; *cf.* Watkins, *Digest of Laws of Georgia*, 684; Marburg and Crawford, *Digest of Laws of Georgia*, 377; *American State Papers, Finance*, II, 690; *Topographical and Statistical Account of Louisiana*, 1804, 65; advertisement, Cumberland Cotton Manufactory, *Knoxville Gazette*, Dec. 17, 1791; advertisement, Nashville Cotton Spinning Factory, in *Impartial Review and Cumberland Repository*, Oct. 11, 13, 1808; advertisement, Manufacturing Company of Washington, D. C., *National Intelligencer*, Feb. 28, 1810.

the first Arkwright mill in New Hampshire and at Greenwich, north of Troy, the first successful mill in New York.[42] A heavy migration of New Englanders was soon to carry cotton manufacturing into the upper Mohawk Valley and the central lake region of the latter State.

So vigorous was the hold taken by the industry during the early period that we can not ascribe its subsequent growth entirely to the interruption of commerce by the embargo and the hostilities with England, but those events and accompanying conditions in Europe greatly assisted that expansion. The Napoleonic wars hastened the transition from flax to cotton throughout the civilized world, by checking the manufacture and sale of linen in large producing centers just when the rival fiber could occupy the market. Especially did this affect the two Americas and the Mediterranean countries.[43] In the United States motives for extending the use of cotton, after the cotton gin and improved machinery cheapened its manipulation, were stronger than elsewhere; and it was employed for cordage, sailcloth, carpets, blankets, and many other purposes for which flax or wool were still used abroad.[44]

The effect of the embargo was twofold: it curtailed foreign supplies of textiles and it caused capital to be transferred from commerce to manufacturing. This was not a net gain, for the business disturbance due to so abrupt and artificial a readjustment brought loss as well as profit even to the industries that were its ultimate beneficiaries. However, a remarkable multiplication of mills ensued. In 1809, if we may trust the testimony of a prominent contemporary engaged in this industry, more than 50 mills were under construction in New England.[45] Most of these were grouped in a compact area extending from Providence northwest along the valley of the Blackstone, southwest through the valley of the Pawtucket, and over the Rhode Island borders into the neighboring townships of Massachusetts and Connecticut. In this locality they occurred at such frequent intervals that a single manu-

[42] Kidder and Gould, *History of New Ipswich*, 224–229; Bagnall, *Textile Industries*, 368, 373.

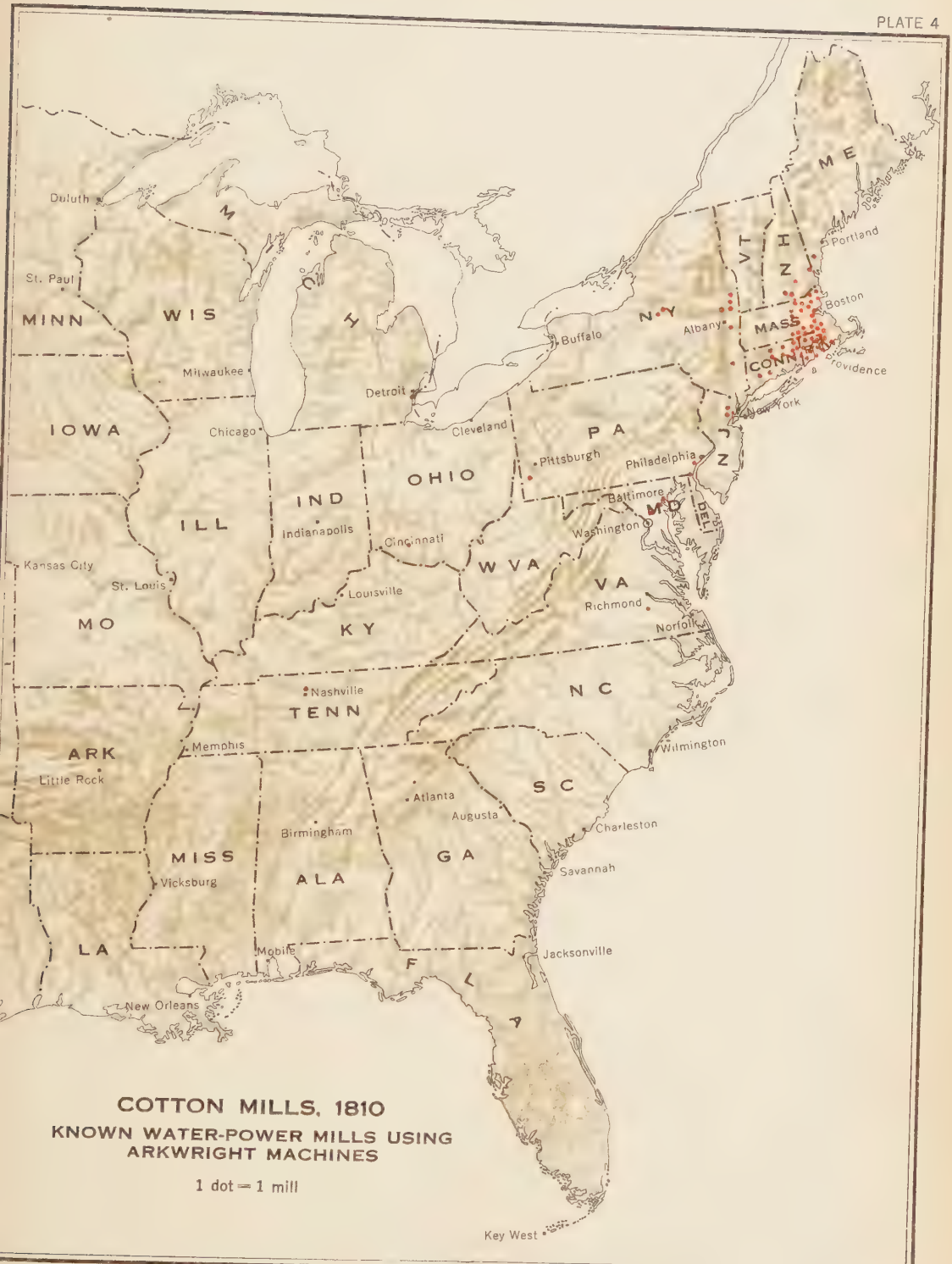
[43] Proceedings of a Manchester (England) Manufacturers' Meeting, in *Carey Clippings, Manufactures*, v, 223.

[44] New York Convention of 1831, *Journal*, 30; Wallis, *Special Report on the New York Industrial Exhibition of 1853*, 14.

[45] Bagnall, *Textile Industries*, 525; *Minutes of Evidence, Orders in Council*, 446, in Great Britain, *Parliamentary Papers*, 1812, III.

COTTON MILLS IN 1810

Plate 4 shows the location of cotton mills known to have been using Arkwright machinery in 1810. The census for that year could not be taken as a guide in making this map, because it does not distinguish between cotton mills having Arkwright machinery and small manufactories employing hand-jennies. Most of the mills indicated are described in Gallatin's *Report on Manufactures*, which was submitted the year the federal enumeration was made and was more explicit than the census in certain details. Several mills not mentioned in that report, but known from other sources to have been in existence in 1810, have been added. According to testimony in the Minutes of Evidence upon the Orders in Council, printed in volume III of the British *Parliamentary Papers* of 1812, there were 89 cotton mills in the United States in 1809. Owing to the large number of mills near Providence, all of the dots on the map could not be given their correct geographical positions, but had to be distributed over the entire State of Rhode Island.



COTTON MILLS, 1810

KNOWN WATER-POWER MILLS USING ARKWRIGHT MACHINES

1 dot = 1 mill

ALBION COLLEGE
LIBRARY

facturer sometimes was part owner and active manager of several neighboring establishments. But many mills were in operation elsewhere in Connecticut and Massachusetts. Cotton was spun at Manchester, New Hampshire;[46] Oneida County, New York, had its pioneer establishment;[47] and the largest factory in the country was completing its first year of operation at Baltimore.[48] Paterson had revived spinning,[49] and Philadelphia, whose textile industries, though important, continued to use less-improved machinery, was to start its first permanently successful Arkwright mill the following year.[50]

The official return of cotton manufactures in 1810 is too inaccurate either to measure the extent of the industry or to describe its location. Probably many census agents did not know what a textile mill was; and they classed as factories plantation loom houses and the cottages or shops of village jenny-spinners. This explains the large number of establishments reported from the South and West. We are told that about 1810 several cotton spinning machines hear Fayetteville were run by water;[51] and even twenty years before that water-driven cards, slubbing-machines, and spinning-frames of 84 spindles were said to be in operation near Statesburg.[52] Less study had been given to the industrial records of the South than to those of the North, and during the subsequent period of indifference or hostility to manufacturing in that section some annals of the earlier interest in those pursuits were doubtless lost. Small mills may have been started in the Carolinas and Georgia, and after a brief infancy have vanished and left no name; but, if so, the fact is curious rather than significant, for it had no relation to the subsequent history of the industry. Such mills must have used local upland cotton, which was still relatively scarce and was not spun successfully by the imperfect power machinery used in America before 1810. In 1803 there was a cotton carding and spinning shop at Pittsburgh,[53] and the next year a small water-power mill was started in Washington County.[54] The hemp and flax spinners of Kentucky probably employed some cotton. But except for the Washington County mill, at Canonsburg, and probaby a mill at Nashville, we have no precise record of Arkwright machinery in either the South or the West until the war with England.

During hostilities cotton mills were established in both these sections.

[46] Bagnall, *Textile Industries*, 561–562.

[47] Bagnall, *Textile Industries*, 506; McLane, *Report on Manufactures*, II, 39; *DeBow's Review*, XVI, 1, Jan. 1854.

[48] Bagnall, *Textile Industries*, 493–494.

[49] Bagnall, *Textile Industries*, 273; Clayton and Nelson, *History of Bergen and Passaic Counties*, 411.

[50] *Pennsylvania Magazine of History;* VIII, 377–379; Bagnall, *Textile Industries*, 582–585; *cf.* also Ebelings, *Erdbeschreibung von Amerika*, IV, 397. Oberholtzer makes the date of the Craige mill, which probably started with Arkwright machinery, earlier; *Philadelphia, A History of the City and its People*, I, 441; *cf.* 535 preceding, and Bagnall, *Textile Industries*, 226.

[51] Morse, *Geography* (ed. 1812), I, 507.

[52] See 425, 534, Note 1, preceding. The best account of early textile manufactures in South Carolina is in Kohn, *Cotton Mills of South Carolina*, 6–16.

[53] *Pittsburgh Gazette*, Aug. 19, 1803; Oct. 26, 1804.

[54] Morse, *Geography* (ed. 1812), I, 425.

In 1811 the Bolton mill was erected in Wilkes County, Georgia;[55] during the war Governor Williams operated a mill at Society Hill, South Carolina; another was running in Sumter District, which possibly may have traced its ancestry to the early establishment at Statesburg;[56] and in 1813 Michael Schenck built a mill near Lincolnton, North Carolina.[57] In 1809 or thereabouts an unsuccessful attempt was made to promote a cotton and woolen factory at Richmond, and this was followed shortly afterwards by a short-lived cotton mill.[58] A "Homespun Company," apparently of larger promise than attainment, made some cloth at Charleston, but whether with improved machinery is uncertain.[59] When the war closed at least two steam cotton mills were running in the West, at Pittsburgh and Lexington respectively; and three horse-power mills, with an aggregate of 1200 spindles, were spinning yarn at Cincinnati.[60]

However, the great expansion had been in New England and the Central States. Between 1809 and 1815 the number of mills within a day's carriage drive of Providence increased from 41 to 169, and the number of spindles from 20,000 to 135,000.[61] In 1815 New London County, Connecticut, had 8 mills, and Essex County, New Jersey, had 13.[62] A score of similar establishments were strung along the Hudson, from Ramapo and Peekskill to Ballston Spa, where a steam factory with a capacity of 11,000 spindles was beginning a brief career.[63] Ten or twelve mills formed another group in Oneida and Otsego counties, and along the lower Delaware were many others. Philadelphia, though it had Arkwright machinery, was mainly a weaving center, and bought yarn for its looms from Rhode Island and Paterson spinners.[64] Baltimore had a considerable cotton industry, and a mill was reported in operation at Petersburg.[65] During the decade ending with 1815 our annual consumption of cotton was supposed to have risen from 500 to 90,000 bales of 300 pounds each. In the latter year the industry was estimated to employ a capital of $40,000,000 and 100,000 operatives.[66] The power-loom was in successful use at Waltham, and both

[55] New England Cotton Manufacturers' Association, *Transactions*, LXVIII, 161, April, 1900.
[56] Mills, *Statistics of South Carolina*, 515–516, 747.
[57] New England Cotton Manufacturers' Association, *Transactions*, LXXI, 296–299, Sept. 1901.
[58] Mordecai, *Richmond in By-gone Days*, 260.
[59] Ramsay, *History of South Carolina*, II, 258, note; *DeBow's Review*, XIV, 615, June 1853.
[60] Philadelphia Society for Promoting National Industry, *Addresses*, 242; *Niles' Register*, VII, 339, Jan. 28, 1815; IX, 35–36, Sept. 16, 1815; Drake, *View of Cincinnati in 1815*, 143.
[61] *American State Papers, Finance*, II, 433; III, 53; Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1863, 71–77.
[62] *Niles' Register*, VIII, 291, June 24, 1815; 151, April 29, 1815; *Carey Clippings, Manufactures*, II, 43.
[63] McLane, *Report on Manufactures*, II, 48–59; *Niles' Register*, VIII, 388, July 29, 1815, Supplement.
[64] *Carey Clippings, Manufactures*, III, 244; Clayton and Nelson, *History of Bergen and Passaic Counties*, 411.
[65] *Niles' Register*, V, 207, Nov. 20, 1813; *American State Papers, Finance*, II, 432.
[66] *American State Papers, Finance*, III, 82.

warp and filling could be spun by power from upland cotton.[67] Though most mills were small, the largest in New England and Maryland now operated over 5000 spindles.

Meanwhile a household weaving industry had grown up in association with mill-spinning. This phase of manufacturing, like the use of minor water-powers, helped to keep spinning dispersed in small establishments. In 1815 the traveler through eastern Connecticut met "every few miles a factory, from which yarn is furnished to every female able to weave in the vicinity."[68] The first mill at Fall River found the neighboring farmers' wives so fully employed by Providence spinners that it opened a store at Hallowell, Maine, as a weaving center and an outlet for goods.[69]

It was because yarn production had extended beyond the capacity of the homespun market for warps and filling, and stimulated these household manufactures, that spinning mills were so adversely affected by the flood of British cottons following the war. Household weavers had made ticking and sheeting, and also plaids, stripes, checks, ginghams, and other yarn-dyed fabrics. Naturally the quality of these varied with the skill of the weaver, but all were coarse and likely to be of uneven grade, either in the same piece, which was woven by different members of the family, or as it came from different looms. Patterns were conventional, and could not be changed with the style or season. At a few points, like New Ipswich, where since the days of the Londonderry settlement fine weaving had been a tradition, there was sufficient local skill to enable mills to manufacture fancy cotton cloth that competed with that imported; but this was the exception.[70]

When at the end of the war with England a flood of foreign goods overwhelmed our markets and closed temporarily or permanently most of the cotton mills of the country, this terminated a definite era in New England manufacturing. Yarn mills in other parts of the country might continue in operation, or if closed might eventually resume, for their market was in part maintained by the demand for yarns on the frontier, where homespun industries survived, and in part by the hand-loom weavers of Philadelphia, where skill and community production maintained textile manufactures resembling those of the Old World. Even New England spinning mills continued to make yarn for southern and western consumption, for the vanishing hoemspun weavers of remote townships in their own States, and especially for manufacturers who bought some of their yarns in the open market. But the typical New England factories, that after 1816 rose on the ruins of the earlier mill industry, performed all the operations of cloth-making within a single establishment, and made only one or two

[67] McLane, *Report on Manufactures*, I, 173; Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1861, 88.

[68] *Carey Clippings, Manufactures*, II, 43; Fuller, *Connecticut as a Manufacturing State*, 15; *cf.* Platt, *History of Poughkeepsie*, 84.

[69] Peck and Earl, *Fall River and Its Industries*, 18.

[70] Bagnall, *Textile Industries*, 478, 479; Kidder and Gould, *History of New Ipswich*, 224–229.

kinds of goods. The terms of the tariff and the successful example of Waltham caused these standard fabrics to be heavy, plain, white cloths. They were almost as easy as duck to make; they had no pattern either in weave or color; and they were used for purposes where fashion and display did not affect market popularity. This era of heavy drills and sheetings lasted from 1815 until the larger production of printing cloths some ten years later, and gave us the trade name "domestics."

The recovery of our cotton manufactures after the peace crisis was nearly as remarkable as that event itself. An imperfectly organized industry, with hastily built and equipped plants, had been almost swept out of existence. Of the 169 mills around Providence those that survived without suspension of reorganization might be counted on one's fingers. The nascent mill industries south of the Potomac ceased to exist. Naturally the reëstablishment of these manufactures took more time than their overthrow. But the new tariff law with its system of minimum valuations, the power-loom with its cheapening of labor costs, and a world-wide business revival that benefited cotton manufacturing more than any other equally important industry, enabled the country speedily to nurse back to a maturer strength than before this most promising of its early industries.[71]

So long as cotton was spun at small country mills and cloth was woven in farmhouses, textile labor did not change location. Mill hands remained part of the rural community, and weaving took the place in home occupations previously held by spinning. But when the power-loom transferred cloth-making completely to factories it created new operative groups, permanent in form but changing in content. This shifting mill personnel was composed of young farm folks who left home to become wage-earners for a few years only. Their temporary industrialization was a phase of our transition from a country-dwelling and mainly agricultural people to a city-dwelling and largely manufacturing nation. During the first half of the century this condition was characteristic principally of New England and of the industrial extension of that section in the upper Hudson and Mohawk Valleys. It hardly began in the South before the Civil War, and it is still a feature of mill life in that region, as in Japan and Russia, where the change from individual to coöperative production is yet in its earliest stages. However, at Philadelphia, Baltimore, and Paterson there was a permanent operative class even in the first decades of the Republic, and that fact influenced the organization of textile industries at those centers. New England's new grouping of labor found physical expression in factory towns, whose rise was the most prominent single feature in the history of our textile manufactures following the last war with England.

The American power-loom was used successfully at Waltham in 1815,

[71] A conservative account of this crisis and the early stages of recovery from it is given in Holmes, *Account of the United States of America*, 195–201.

and the Scotch or Gilmour loom at North Providence in 1817.[72] Their introduction in the midst of a great depression possibly facilitated their general adoption during the reorganization of the cotton industry in the following period of recovery. Duck was woven by power at Watertown, within a mile or so of Waltham, in 1816.[73] The Scotch loom was hardly in operation at North Providence when it was adopted by the Coventry Company, in 1817, thus receiving the indorsement of the third largest cotton factory in New England.[74] In 1818 two mills at Taunton and one in Oneida County, New York, installed this machinery to be followed the next year by a mill at Fall River.[75] Finally, in 1820, the largest company outside New England, after some months of experiment, began weaving cloth with 30 power-looms at Baltimore.[76] That year the partial returns of the census indicate that at least one-third of the 2400 looms in American cotton mills were operated by power, and that this improvement had been adopted in every Atlantic State north of Virginia except Maine and Delaware. At that time, according to census agents, our cotton factories contained 325,000 spindles, but 40 per cent of these were idle.[77] Nevertheless the industry already was convalescent, and the following year it recovered completely from its past disasters.

Cotton manufactures in the South reproduced rather closely the order of development exhibited by New England twenty years before. The crisis of 1816 and 1817 caused several mills in South Carolina to close.[78] However, immediately after the war one or two colonies of New England cotton-spinners—possibly driven from home by hard times in their own section—settled in the Carolina uplands and founded a new group of mills in Spartanburg County and vicinity. They made yarn and possibly some cloth, but their principal sales were among the mountain farmers, who wove cotton filling with linen warps into homespuns, as New England farmers had done at the close of the previous century.[79] These mills throve sufficiently to attract Providence capital during the following decade, and before 1830 Carolina yarn was shipped to New York markets.[80]

During the tariff controversies of this period a propaganda of manufactures started in the South, partly to free that section from economic

[72] Batchelder, *Cotton Manufactures*, 102; Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1861, 77–78, 88–89; Bagnall, *Textile Industries*, 548–549.

[73] Bagnall, *Textile Industries*, 328.

[74] Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1864, 68–69; Bagnall, *Textile Industries*, 411.

[75] Bagnall, *Textile Industries*, 425, 470, 509; *Bagnall Papers*, III, 1918; *cf.* Peck and Earl, *Fall River and Its Industries*, 19; Cobbett, *Selections from Political Writings*, V, 487.

[76] Bagnall, *Textile Industries*, 495.

[77] Compiled from *American State Papers, Finance*, IV, 29, *et seq.*

[78] Mills, *Statistics of South Carolina*, 515–516, 747.

[79] Landrum, *History of Spartanburg County*, 139–162; *cf.* Mills, *Statistics of South Carolina* 730; Southern Cotton Spinners' Association, *Proceedings*, 1903, 41–42; *Southern and Western Textile Excelsior;* June 10, 1899, 18; Kohn, *Cotton Mills of South Carolina*, 13; Holmes, *Account of the United States, of America*, 225.

[80] *Niles' Register*, XXVII, 352, Jan. 29, 1825; XXXIV, 175, May 10, 1828.

dependence on the North and to intimidate protectionist factory-owners by the threat of competition, and partly from a real belief that more money was to be made in industrial than in plantation investments.[81] Governor Williams reëstablished his factory at Society Hill, and made yarn for northern agents and negro cloth for neighboring customers. A flood, in 1829, destroyed his establishment, but he later resumed manufacturing.[82] John C. Calhoun was interested in a similar enterprise, and either this factory or another one at Pendleton wove cotton-warp blankets.[83] By the early thirties power-spinning and some factory-weaving—probably on hand-looms—were permanently established in the upland-cotton country.

Cotton-spinning in the West, though it started early, never became an important industry. Enough Alabama and Tennessee cotton came to market down the tributaries of the Ohio to encourage its manufacture in Kentucky, whose mills in 1820 had more spindles than those of Maine or Vermont, or any other western or southern State. These establishments were small, and with one or two exceptions produced only yarn. Of 12 in Lexington and vicinity, only one used steam, and the remainder were presumably operated by hand or by horses.[84] There were 4 mills at Chillicothe, Ohio, of which only one used water-power.[85] The single manufactory in Indiana—where cotton was then cultivated for local use—had 108 spindles and was driven by oxen on an inclined plane.[86]

During the following decade the industry made moderate progress in the West. Mills were erected near Cincinnati and Dayton and at New Albany, Vincennes, and other points.[87] There was a successful mill at Mount Pleasant, Tennessee.[88] Steubenville had two steam cotton factories.[89] A more positive development occurred around Pittsburgh, in whose immediate neighborhood there were a half-dozen yarn mills driven by steam or water. One of these operated 16 power-looms on sheetings, and was probably the only factory west of the mountains that had adopted this improvement. Pittsburgh followed the precedent of Philadelphia in making a separate branch of weaving. The two largest cloth-makers of that city each employed

[81] Similar political motives were behind later attempts to foster manufactures in the South; *cf.* Kittell, *Southern Wealth and Northern Profits*, 65.

[82] *Niles' Register*, XXXIV, 379, Aug. 9, 1828; XXXV, 386, Feb. 7, 1829; XXXVI, 99, Apr. 11, 1829; *American Annual Register*, 1827–1829, III, 136–138; Kohn, *Cotton Mills of South Carolina*, 19; Appendix X.

[83] Calhoun, *Correspondence*, in American Historical Association, *Annual Report*, 1899, II, 331, letter to John E. Calhoun, Jan. 30, 1834; *cf. id.*, 396, letter to James E. Calhoun, Apr. 1, 1838; R. Hazard, *Manuscript Letter Book*, letter to John E. Calhoun, Aug. 23, Nov. 30, 1830; Mills, *Statistics of South Carolina*, 677; *Niles' Register*, XL, 452, Aug. 27, 1831.

[84] Fearon, *Sketches of America*, 245; *Documentary History of American Industrial Society*, II, 301; Blowe, *View of the United States*, 585–586.

[85] Dana, *Geographical Sketches*, 76.

[86] Dana, *Geographical Sketches*, 115; Thomas, *Travels through the Western Country*, 150.

[87] Miller, *New States and Territories*, 16–17; advertisement for spinners in *Liberty Hall and Cincinnati Gazette*, Mar. 4, 1826; *Niles' Register*, XLII, 421, Aug. 11, 1832; McLane, *Report on Manufactures*, II, 867–868; *Niles' Register*, XXI, 112, Oct. 13, 1821; *American Textile Manufacturer*, I, 124, July 1880.

[88] R. Hazard, *Manuscript Letter Book*, letter to Peyton H. Shipworth, Mt. Pleasant, Dec. 15, 1830.

[89] *Niles' Register*, XXVIII, 82, Apr. 9, 1825; XII, 144, Apr. 26, 1817; Blowe, *View of the United States*, 544.

80 hand-looms and double that number of operatives. They dyed their yarns and made principally plaids, with some stripes and checks.[90] Most of the yarns spun in the West were very coarse, seldom exceeding No. 10 in fineness, and they were marketed for homespun use either in the neighborhood of the mills or down the river.[91] Though some Pittsburgh cottons were sold in Philadelphia and Maryland, and as early as 1815 western yarn was carried to eastern markets via New Orleans, there is no evidence that manufacturers in this section consigned yarn regularly to New York agents, as did those of the South.[92]

While these pioneer undertakings were struggling into life in remoter parts of the country, the cotton manufactures of New England and the Middle States were passing through maturer experiences. Mills that survived the dark years between 1815 and 1820 were generally fitted by location, management, equipment, and resources to continue the industry successfully. So far as the precarious statistics of 1820 are a ground for conclusions, cotton-spinning by this time had nearly recovered the position occupied in 1815. About one-third of the spindles of New England and New York were making yarn for power-looms. The ratio of looms to spindles was higher in Massachusetts than in neighboring States. New Jersey and Delaware mills were engaged chiefly in spinning for Philadelphia manufacturers, but most of the yarn made in Maryland was woven in local factories. Therefore, except for the small but important district tributary to Philadelphia, the centralized system of manufacture was rapidly extending.

This concentration affected all aspects of the industry. More processes were performed in one establishment; the capacity of individual mills was enlarged; and plants began to group in narrow areas. Technical and commercial limitations no longer restricted the size of factories so much as formerly; but most mills, and most spindles, even in old manufacturing districts, were still moved by small water-powers. This could not be changed without transferring cotton manufactures to new sites. In Great Britain the adoption of steam-power speedily accomplished this transition. But in America such a relocation of the industry was not practicable, though new factories were usually built where there was sufficient water to move big plants, and groups of small mills in one neighborhood were merged into single establishments.

The series of large water-power developments described in an earlier chapter, which gave rise to the new manufacturing cities on the Merrimac, was anticipated or repeated in a smaller way at several mill villages on rivers tributary to the New England sounds. Webster, Woonsocket,

[90] Royall, *Travels*, II, 106–108; *cf.* Jones, *Pittsburgh in 1826*, 49; Hazard, *Register of Pennsylvania*, II, 273, Nov. 8, 1828; I, 167–168, March 15, 1828; X, 142, Sept. 1, 1832; XIV, 304, Nov. 8, 1834; Saxe-Weimar, *Reise durch Nord Amerika*, II, 217; Benjamin Herr's *Journals*, in *German-American Annals*, V, 26, Jan. 1903; *Niles' Register*, XLV, 217, Nov. 20, 1833; McLane, *Report on Manufactures*, II, 461–473; *American State Papers, Finance*, V, 841–842.

[91] *Cf.* McLane, *Report on Manufactures*, II, 867–868.

[92] McLane, *Report on Manufactures*, II, 466, question 16; 468, question 18; *Niles' Register* VIII, 368, July 22, 1815.

Willimantic, and most of the interior towns of that district date their growth, if not their origin, from this period. In 1830 an extensive power project was completed near Norwich.[93] Fall River, earlier known as Troy, owed its rise almost entirely to cotton-spinning, and textile mills added to the industrial importance of Taunton.

No reliable records exist by which to measure the extent of organized cotton manufactures in 1810 and 1820, but we can conjecture with assurance that, in spite of all setbacks, they had grown with rapidity. Their subsequent expansion was equally marked. Between 1820 and 1832 the number of spindles in Rhode Island increased in round numbers from 70,000 to 240,000.[94] There may have been 1 mill loom in use for every 160 spindles the former date; there was 1 for every 40 spindles in 1832. Connecticut increased its spindles from 30,000 to 140,000, and its loom capacity in the same ratio as Rhode Island.[95] Massachusetts, with more capital and room for growth, raised its spindles from 52,000 to 340,000, and employed relatively more factory looms than its neighbors.[96] It had now passed Rhode Island as our leading cotton-manufacturing State. New Hampshire, which in 1820 had but 15,000 spindles, in 1831 rivaled Connecticut in spinning and excelled that State in weaving. Meanwhile, New York more than trebled its spindles, having in 1831 nearly 157,000 in operation, but it employed relatively fewer looms than New England.[97] New Jersey showed about the same rate of progress as New York; Pennsylvania had more looms in use than any other State except Massachusetts, but in spinning ranked only with Connecticut and New Hampshire; Maryland, though it had doubled its manufacturing equipment, had hardly realized the promise of its earlier enterprises. In the country as a whole, between 1820 and 1831, the number of spindles quadrupled, and the number of factory looms increased tenfold. But this does not express the whole growth of factory production; for in 1820 more than a third of our spindles were idle, and during these eleven years the capacity of every textile machine had multiplied.

The history of this progress embraces two salient features: the appearance of big corporations with plants designed for special goods, and the rise of calico-printing to importance. In 1821 there was a better demand for domestic manufactures than had existed since the war with England, and this condition continued without serious alteration, except for a temporary overstock of coarse cloths in 1824,

[93] *Cf.* White, *Slater*, 261–270.

[94] Computed from *American State Papers, Finance*, IV, 44–49; McLane, *Report on Manufactures*, I, 974; *cf.* New York Convention of 1831, *Journal Reports of Committees* 112.

[95] *American State Papers, Finance*, IV, 50–57; McLane, *Report on Manufactures*, I, 988 (including new mills); *cf.* New York Convention of 1831, *Journal, Reports of Committees*, 112.

[96] *American State Papers, Finance*, IV, 36–43, 291–292; New York Convention of 1831, *Journal, Reports of Committees*, 112.

[97] *American State Papers, Finance*, IV, 65–99; McLane, *Report on Manufactures*, II, 58; New York Convention of 1831, *Journal, Reports of Committees*, 112.

until towards the end of the decade.[98] Following the tariff of 1828 came a period of unusually active mill-building and consequent overproduction, which resulted in the short but sharp crisis of the succeeding season.[99] But the recovery was so prompt that by the autumn of 1830 Providence papers stated that prospects of manufacturers had not been brighter since the peace of 1815.[100]

Though confidence was unsettled somewhat by the tariff controversies of 1832, it was not until 1834 that another period of stagnation overtook the cotton market. These fourteen years of almost uniform prosperity saw the principal business interest of New England change from commerce to manufacturing. Soon after the close of the previous war many merchants, disappointed of recovering the prosperity they had enjoyed before that event as the world's chief neutral carriers and traders, and foreseeing that the success of automatic weaving in America would end one of the most profitable branches of the Indian trade, transferred their capital definitely to industrial pursuits. This determined the form and policy of the big manufacturing corporations whose establishment was the distinctive feature of the following period.

Even the depression following the war did not check the prosperous career of the Boston Manufacturing Company, which produced its first cloth in 1815, built a second larger mill two years later, and added a third factory and a bleachery in 1820.[101] This convinced Boston capitalists that cotton goods could be made profitably in New England, and that the Waltham method best suited our conditions of production. Therefore, as soon as the business horizon cleared, measures were taken to start this system of manufacture at other places. Soon after 1820, in addition to smaller enterprises, two groups of large factories were promoted. The first was at Lowell, and made that city until the Civil War the leading textile center of America; the other was at Dover and Somersworth, in New Hampshire, on the boundary between that State and Maine. The latter mills were built with Boston money, but by different investors from those who supported Waltham and were engaged in founding Lowell. As a consequence of this movement, Boston became the conspicuous financial and commercial supporter of New England's textile development during the years that followed 1820, as Providence had been during the years preceding.

The conception of Lowell as a manufacturing city was probably an afterthought, though it dawned early in the consideration of this project.[102] When the Boston Company completed its third mill at

[98] *Niles' Register*, XXI, 39, Sept. 15, 1821; XXII, 225, June 8, 1822; XXVIII, 84, Apr. 9, 1825; XXXI, 55, Sept. 23, 1826; XXXIV, 281, June 28, 1828; *American State Papers, Finance*, IV, 488; *cf.* 308–309, 431–432, preceding.

[99] *Cf.* White, *Slater*, 247–248; *Niles' Register*, XXXVI, 283, June 27, 1829; XXXVI, 413, Aug. 22, 1829.

[100] *Pawtucket Chronicle*, quoted in *Niles' Register*, XXXIX, 90, Oct. 2, 1830; *cf. id.*, XXXVIII, 369, July 17, 1830; XL, 290, June 25, 1831; XLI, 441, Feb. 18, 1832; *American Textile Manufacturer*, I, 124, July 1880; McLane, *Report on Manufactures*, I, 1.

[101] *Bagnall Papers*, III, 2000, 2011, 2013–2014, 2030–2031; Miles, *Lowell*, 21–22.

[102] Batchelder, *Cotton Manufactures*, 69.

Waltham, it practically exhausted the water-power then available at that site. With the erection of a bleachery, it began in a small way to make finer goods than the No. 14 unbleached sheetings that were its standard fabric. The cautious directors of the company, having won a steady sale for the latter cloth, were careful not to oversupply the demand by too rapid expansion; but they saw an opportunity to apply their system of manufacture to making calicoes, and thus to capture a section of the domestic market still held by foreign goods.[103] In seeking a site for this purpose the large water-power on the Merrimac was chanced upon, and with its development came a vision of broader possibilities. At its inception the new project was only a repetition of what had been done at Humphreysville, Slatersville, and other places. The Merrimac Company, which was the original Lowell corporation, was organized in 1822 with $600,000 capital, or the amount then employed by the Boston Company, which was the largest textile concern in New England.[103] In 1825, the year after its first factory was opened, the directors disembarrassed themselves of water-power and town-site responsibilities by organizing a separate corporation to assume them, and two years later they doubled their original capital, which was devoted entirely to manufacturing.[104] After this the expansion of the company's resources was rapid, and ten years from the time it shipped its first goods to Boston its factories contained over 30,000 spindles and 1,000 looms.[104]

Meanwhile, in 1825, the Hamilton Company was organized, with $600,000 capital, to make drillings—a fabric which it originated—and fancy cloths;[105] in 1828 the Appleton and Lowell companies were chartered, both of which manufactured coarse goods to supply a demand that had outgrown the capacity of Waltham;[106] and in 1830 the Suffolk, Tremont, and Lawrence companies were started. By the end of 1834 these six corporations operated 19 cotton mills at Lowell, with 110,000 spindles and 4000 looms.[107] This represented the most remarkable decade of progress, in a single place and industry, as yet achieved in our manufacturing history.

In 1822, while the Merrimac Company was being organized, two corporations supported by Boston capital began improvements at points a few miles apart on the Salmon or Piscataqua river so famous in the lumbering annals of the colonies. The project at Dover, reorganized five years later as the Cocheco Company, eventually expended $2,700,000 and soon was operating 20,000 spindles and 750 looms.[108] The Great Falls Company, at Somersworth, invested $750,000

[103] *Hunt's Merchants' Magazine*, xxx, 371, Mar. 1854; xviii, 362, Apr. 1848; *Bagnall Papers*, iii, 2138; *cf. Boston Newsletter*, 179, Oct. 14, 1826; *American Annual Register*, 1825–1826, i, 319.

[104] *Bagnall Papers*, iii, 2070–2075; 2162; *Niles' Register*, xxxvi, 363, July 31, 1824; White, *Slater*, 255.

[105] *Bagnall Papers*, iii, 2219–2222; White, *Slater*, 254.

[106] *Bagnall Papers*, iii, 2279.

[107] White, *Slater*, 255, 256; *cf. Niles' Register*, li, 22, Sept. 10, 1836.

[108] *Niles' Register*, xxii, 67, Mar. 30, 1822; xxxi, 115, Oct. 21, 1826; *Bagnall Papers*, iii, 2164; McLane, *Report on Manufactures*, i, 634.

in their original enterprise, and in 1830 had one of the largest plants in the country, with 31,000 spindles, 22,000 of which were installed in a single mill.[109] Both these companies were engaged in making print cloth. Just before 1830 another corporation started on a similar scale near Saco, Maine, but its mill was destroyed by fire as it neared completion.[110]

These large corporations, regarded as gigantic in their day, did not monopolize the progress of cotton manufactures during the revival that followed 1820; indeed they did not contribute a major fraction to the spindle increase that then occurred. But these enterprises and others like them were the prominent and, as we see in aftersight, the permanent new feature of the years in question. They expressed the type of industrial organization that eventually was to prevail in America. However, their success at this particular time was aided by the introduction of calico-printing and fancy weaving.

During the ten years ending with 1830 print cloths acquired as important a place among domestic fabrics as the coarse sheetings that hitherto had been the distinctive product of our factories. This was due partly to the introduction of cylinder machines, that cheapened the labor cost of making calicoes and added to their attractiveness; partly to a fashion for printed goods, which had become inexpensive enough to displace the linseys, checks, and homespun plaids hitherto worn by the people who create volume of consumption; and partly to the growing ability of our manufacturers, with better machinery and longer experience, to compete with other countries in serving demands determined by taste and style. Probably the additional duties on fine goods afforded by the tariff assisted this transition, but it was already under way before the law was modified.

Linens and silks were printed by colonial craftsmen,[111] and in 1772 or thereabouts, John Hewson, a calico printer who recently had immigrated to America at the suggestion of Benjamin Franklin, opened a shop at Philadelphia with 6 English journeymen. He reëstablished his business after the Revolution, and it was continued by his son. East India cottons were printed at Boston, and domestic cloths in Rhode Island and Delaware, soon after 1790.[112] About the beginning of the century the business was revived at Pawtucket. There were then three establishments near Philadelphia, printing 300,000 yards annually, and Congress was asked to protect this industry by higher

[109] *Niles' Register*, XXXI, 115, Oct. 21, 1826; XXXVI, 130, Apr. 25, 1829; *American Annual Register*, 1826–1827, II, 441–442; *id.*, 1830–1831, VI, 313–314; Hurd, *History of Rockingham and Strafford Counties*, 683–685; *Boston Newsletter*, 91, Oct. 21, 1826; McLane, *Report on Manufactures*, I, 638–641; *cf. Sen. Doc.* 72, 62d Cong., 1st sess., Part III, 1705–1708.

[110] *Niles' Register*, XXXVIII, 48, Mar. 6, 1830.

[111] *Cf.* advertisements *Boston Newsletter*, Apr. 28, May 5, 1712; Sept. 4, 1760; *Pennsylvania Gazette*, Aug. 29, 1781; Bagnall, *Textile Industries*, 59, 110–111; *Columbian Centinel*, July 17, 1790; Brissot, *Voyage*, II, 389.

[112] *DeBow's Review*, XVI, 2, Jan. 1854; *Hunt's Merchants' Magazine*, XXXIV, 674, June 1856; Massachusetts Historical Society, *Collections*, Ser. I, vol. III, 280–281; La Rochefoucault, *Travels through North America*, II, 255; Bishop, *History of American Manufactures*, II, 59–60; Ebelings, *Erdbeschreibung von America*, V, 80; Calico Printing Manufacturing Society, *Minutes, 1795–1798*.

duties.[113] One of these firms imported in 1809 the first cylinder machine used in America; in 1812 it printed 1,400,000 yards of calico; and it was still active fifteen years later.[114] About 1810 the same industry employed considerable capital near Baltimore, where facilities existed for printing 12,000 yards a week.[115] These early firms used mainly cottons imported from India, and some printing was done by houses engaged in the East India trade; but it is likely that before 1820 print cloths were made in the vicinity of Philadelphia.[116] That city continued to make calicoes as a branch of those manufactures of fine and fancy fabrics of which it was the peculiar center. In 1832 four works in the Frankford neighborhood printed annually 8,000,000 yards, in addition to which there were several bleacheries and dye houses in the same vicinity.[117] Cylinder machines were then manufactured in Philadelphia, and cylinders were engraved, indicating a maturity of the industry hardly attained elsewhere.[118]

About 1824 printing was started in New England on the large and systematic plant characteristic of Boston undertakings. Nathan Appleton and other merchants who backed the Waltham enterprise knew thoroughly the profits and prospects of the trade in foreign calicoes. As soon as their Waltham experience made them equally familiar with manufacturing costs, they saw that such goods could be made in America more cheaply than they could be imported.[119] So the Merrimac Company, which was organized to make calicoes, began printing in 1824, the year that other large works at Taunton, under construction in 1823, probably went into operation, and that Andrew Rogeson commenced the business that developed into the Fall River Print Works.[120] The next year printing began near Providence; in 1826 a firm soon to attain importance started at Hudson; and in 1827 a large plant went into operation at Dover to serve the big mills of the Cocheco corporation.[121] Meanwhile, the Warren Company, near Baltimore, had a printing establishment in connection with its factory.[122] About the same time several printeries were built tributary

[113] *American State Papers, Finance,* II, 80; Bishop, *History of American Manufactures,* II, 100.

[114] Bishop, *History of American Manufactures,* II, 164; *Bagnall Papers,* III, 1782, 1784–1785; *American State Papers, Finance,* II, 430.

[115] *American State Papers, Finance,* II, 430.

[116] *Niles' Register,* XX, 403, Aug. 25, 1821; Ebelings, *Erdbeschreibung von Amerika,* V, 80.

[117] McLane, *Report on Manufactures,* II, 200.

[118] Freedley, *Philadelphia and Its Manufactures,* 306; Bishop *History of American Manufactures,* II, 275.

[119] *Bagnell Papers,* III, 2329.

[120] *Bagnall Papers,* III, 2170–2172; *Niles' Register,* XXV, 247, Dec. 20, 1823; XXVIII, 145, May 7, 1825; XXXIII, 204, Nov. 24, 1827; XL, 307, July 2, 1831; *Boston Newsletter,* 215, Nov. 4, 1826; Appleton, *Introduction of the Power Loom,* 25–26; McLane, *Report on Manufactures,* I, 166–168 Peck and Earl, *Fall River and Its Industries,* 30; Fenner, *Falls River,* 24.

[121] *Bagnall Papers,* III, 1756; *American State Papers, Finance,* V, 842; McLane, *Report on Manufactures,* II, 36, 58, 59; White, *Slater,* 401–403; *Niles' Register,* XXXVI, 283, June 27, 1829; McLane, *Report on Manufactures,* I, 634; Harrisburg Convention, *Proceedings,* 44.

[122] *Niles' Register,* XXVIII, 338, July 30, 1825; XXXIII, 204, Nov. 24, 1827; XXXIX, 125, Oct. 16, 1830.

to Paterson, and smaller plants began operation in North Adams, at Sanford, Maine, and in other places.[123] The erection of these works—some of them capable of handling the output of several mills—within such a short period had a marked influence on cotton manufacturing. Though our early print cloths were coarse compared with those made to-day, they were finer than the heavy sheetings and tickings made previously, and the employment of so many spindles in their production relieved the domestic market of a threatened overstock of the latter fabrics. Printing tended further to concentrate the industry geographically, though except at Lowell and Dover most works were operated independently of a particular factory.

It was estimated in 1831 that bleached cloths formed one-third and prints formed one-tenth of the cotton goods made in America.[124] Factory products were further diversified by loom improvements that enabled patterns to be woven by power—a faculty of automatic machinery that stimulated the invention of new fabrics. Every labor-saving device introduced in our factories enlarged the range of goods they could make in competition with Europe. By 1830 such standard fine weaves as No. 45 sheetings, cambrics, and muslins were manufactured at Providence, Whitestown (New York), and Philadelphia;[125] and new heavy fabrics, including cotton substitutes for dowlas and negro cloth, had been originated.[126] Soon after 1820 the manufacture of cotton duck began at Paterson and Baltimore, and it later was revived at Boston.[127]

Outside of New England the example of Lowell's big factories had little influence upon manufacturing methods, though in New York and Maryland spinning and weaving were usually combined in one plant. In 1832 the largest mill in New York had less than 10,000 spindles.[128] Hand-loom weaving still prevailed at Philadelphia, whose manufacturers bought most of the fine yarns spun at Paterson, as well as the output of the small mills in eastern Pennsylvania.[129] There were some 30 spinning mills in the immediate vicinity of the former city, and Manayunk between 1819 and 1827 grew from a toll-house to a manufacturing town of nearly 3,000 people, with 5 cotton factories, and

[123] *Niles' Register*, XXIX, 68, Oct. 1, 1825; *American Annual Register*, 1830–1831, VI, 333; McLane, *Report on Manufactures*, II, 140, 145; I, 29, 148–149.

[124] Reuss, *Calculations and Statements*, 274; New York Convention of 1831, *Journal*, 112, 113. For volume of product at this time; *Scientific American*, XIX, 358, Dec. 2, 1868; *Niles' Register*, XXXII, 390, Aug. 11, 1827; XXXVII, 297, Jan. 2, 1830; *Banner of the Constitution*, II, 191, May 11, 1831; *cf.*, however, *American State Papers, Finance*, V, 843.

[125] McLane, *Report on Manufactures*, I, 951, 935–936; *American State Papers, Finance*, V, 842–843; *Niles' Register*, XVIII, 399, July 29, 1820; XXXIX, 90, Oct. 2, 1830.

[126] *Banner of the Constitution*, II, 191, May 11, 1831; *Niles' Register*, XXXIX, 153, Oct. 30, 1830.

[127] *American Textile Manufacturer*, I, 59, April 1880; *American State Papers, Finance*, V, 835; Bagnall, *Textile Industries*, 496; *Niles' Register*, XXXIV, 249, June 14, 1828; XXXVII, 82, Oct. 3, 1829; XXXVIII, 400, July 31, 1830; XXXIX, 205, Nov. 20, 1830. For earlier duck factories, see Bagnall, *Textile Industries*, 325, 328–331; *Niles' Register*, VIII, 369, July 29, 1815.

[128] McLane, *Report on Manufactures*, II, 48.

[129] McLane, *Report on Manufactures*, II, 136, 144, 147, 148, 150, 151, 153, 155, 158, 159, 161, 165, question 16; *cf. Niles' Register*, XXIX, 83, Oct. 8, 1825; Carey and Lea, *Philadelphia in 1824*, 35; *Niles' Register*, XXVII, 6, Sept. 4, 1824; XXVII, 149, Nov. 6, 1824; Hazard, *Register of Pennsylvania*, I, 28, Jan. 12, 1828.

other industries.[130] Cloth was woven in separate establishments also at Paterson, Wilmington, and Baltimore, and at these places, as well as in New York City, hand-loom weavers continued to find employment.[131]

In order to evade popular prejudice domestic manufactures often were sold as imported goods, reversing the practice of those English exporters who shipped the inferior products of British looms under American labels. The fine prints made at Hudson were marketed in New York as foreign fabrics, and until the Civil War Philadelphia manufactures were sometimes classed as "Philadelphia goods," comprising heavy, substantial cloths; and as "imported goods," which name was applied to the fine domestic cloths of delicate dye and texture made in that city and sold to retailers as German, Parisian, and Manchester importations.[132] While our manufacturers were adopting this subterfuge to win a home market for their finer fabrics, they began to export cotton yarns, sheetings, and coarse calicoes to Spanish America, China, Calcutta, and the Levant. As early as 1823 goods were manufactured at Providence on export orders, and the indigo and dyewoods employed in this industry were purchased in India and tropical America in exchange for the cloths they were used to color.[133] This over-sea trade, while it never absorbed a large share of our factory output, served the important function of quickening sales in times of incipient over-production and thus adding steadiness to the domestic market.

When after 1830 a reaction began against the high-tariff policy enforced since 1824, the cotton industry was strong enough to survive without distress the contingencies of domestic legislation, though the alternations of active and dull demand that continued to disturb manufacturers usually originated in conditions outside the country. Sometimes, as in 1834, an overstock in foreign markets checked sales at home, and fluctuations in the price of raw cotton, almost as embarrassing to factory-owners as a slow sale of their products, were determined by Liverpool quotations; but progress was steady in spite of lower duties and of the financial crisis that in 1837 interrupted business development. Between 1836 and 1839, during the three years of severest depression, the number of spindles at Lowell rose from 130,000 to 163,000, and the number of looms from 4,321 to 5,094.[134] Manchester was founded in 1835, and the Stark mills at that place—soon to become the largest producers in New Hampshire—were organized the year following the panic.[135] Meantime, Nashua, which had been growing in importance since 1823, became a third prominent spindle center

[130] *American Annual Register*, 1827–1829, III, 119; Hazard, *Register of Pennsylvania*, II, 14–15, July 19, 1828.

[131] New York Convention of 1831, *Journal, Reports of Committees*, 112; *Niles' Register*, XXIV, Mar. 8, 1823.

[132] *Niles' Register*, XXXVI, 283, June 27, 1829; Freedley, *Philadelphia and Its Manufactures*, 234.

[133] *Niles' Register*, XXIII, 290, Jan. 11, 1823; XL, 290, June 25, 1831.

[134] *Hunt's Merchants' Magazine*, XLIV, 541, Apr. 1861; *Niles' Register*, LVI, 260, June 22, 1839.

[135] Daniel L. Perkins, in Manchester Historical Association, *Collections*, I, Part 1, p. 20; Clarke, *Manchester*, 269–87.

on the Merrimac.[136] At Saco, Chicopee, and elsewhere in the district of large water-powers, other big factories were erected. In northern New England the spindle increase between 1831 and 1840 was greater than elsewhere except in Rhode Island, but the number of establishments showed moderate growth; and in a less degree this tendency toward centralization continued in other parts of the country. But in Rhode Island the multiplication of mills almost kept pace with the increase of machinery. During these nine years the number of spindles employed in the United States about doubled, and in 1840, according to the census, they exceeded 2,250,000. That date closed the first half century of power-spinning in America. We probably ranked next to the mother country in this industry, but compared with her our progress had been moderate. In 1817, less than fifty years after Arkwright installed his first complete machinery at Cromford, the number of spindles in Great Britain was thought to exceed 6,500,000.[137]

Our principal textile areas continued to be near the New England coast and in the valleys of the Hudson and the Delaware, but within this region three districts having different manufacturing practice had arisen. North of Boston, Waltham precedents governed organization and technical processes. Cotton factories were large and controlled by big corporations; they spun yarns for both warp and filling mostly on throstle-frames, and produced large quantities of standard cloth. In southern New England and in the upper Hudson Valley mills of more moderate size were operated by individual proprietors or small stock companies; they employed many mule-spindles and spun fine numbers; yarn as well as cloth was marketed, and varied fabrics were produced.[138] Paterson and Philadelphia continued to make cloth in the way it was made in England. In these cities manual skill and trade experience accomplished what automatic mechanism and scientific management attained along the Merrimac. For the most part the spinner, the dyer, the weaver, and the printer and finisher were independent manufacturers, performing their respective services for cloth merchants, or buying the product of the operation preceding their own and selling it one step nearer completion to their successor.

In Delaware and Maryland, cotton manufacturing was about stationary during the ten years before 1840, but it increased with relative rapidity in Virginia, where a group of mills had grown up at Richmond and Petersburg, which were receiving-points for cotton from the Carolina uplands.[139] In 1842 the latter town had 25,000 spindles and 724 looms employed upon coarse sheetings, of which over 20,000 yards were made daily.[140] More than half the spindles in Vir-

[136] Parker, *History of the City of Nashua*, 437.
[137] Baines, *History of Cotton Manufacture*, 369; *cf.* Chapman, *Lancashire Cotton Industry*, 58.
[138] Gregg, *Domestic Industry*, 25–27, Montgomery, *Cotton Manufacture*, 13–14.
[139] Bishop, *History of American Manufactures*, II, 318; *Niles' Register*, XL, 281, 282, June 18, 1831; White, *Slater*, 278; Buckingham, *Slave States*, II, 411, 426, 436, 535, 551–552.
[140] Hazard, *United States Register*, VI, 363, June 8, 1842.

ginia were at this place. These points also manufactured osnaburgs and cotton bagging for sugar sacks, which were sold in Brazil, whither they were carried in the wake of an old flour trade between Richmond and that country.[141] Fayetteville in North Carolina, as well as Columbia and the Augusta-Hamburg neighborhood of South Carolina and Georgia, owed their cotton mills to their situation where wagon-cotton was transferred to water carriers. But yarn mills multiplied elsewhere along the South Atlantic highlands, well into Georgia and across the mountains into Tennessee. No accurate statement of their number and spindle capacity is possible—for the census confuses mills with jenny manufactories—but after 1830 individual establishments began to leave more precise records than during the earlier part of the century. Yarn continued to be spun at small mills in the Ohio Valley, and in 1840 Pittsburgh had a group of steam cotton factories. But neither the South nor the West gave promise of a textile development comparable with that of the northern and eastern States.

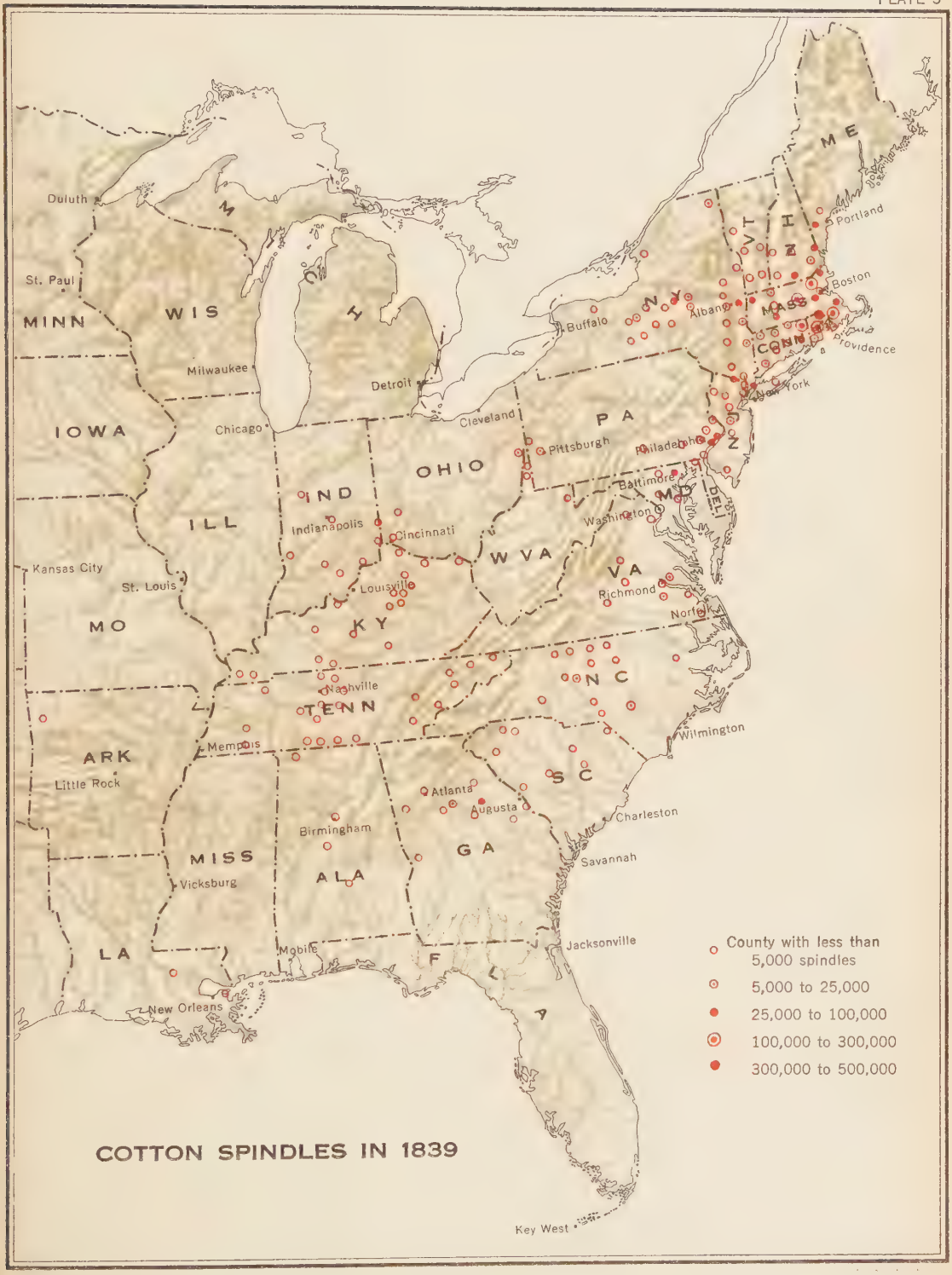
Within this older region, geographical as well as plant concentration continued. In 1840 more than two-thirds of the spindles in Pennsylvania were within 30 miles of Philadelphia; a still larger portion of those in New Jersey were at Paterson; Rensselaer and Oneida counties had well toward one-half of the spindles in New York; Lowell contained one-fourth of those in Massachusetts; Windham County had more than two-thirds of those in Connecticut; and Providence County, which adjoined Windham on the east and contained more cotton machinery than any other State except Massachusetts, held within its narrow limits nearly three-fourths of the spindles in Rhode Island.[142]

During the twenty years that intervened between 1840 and the Civil War the number of spindles in the country more than doubled, rising to over 5,200,000 in 1860.[143] Our cotton industry grew nearly twice as fast as the population. This growth was accompanied by the usual alternations of prosperity and depression. These began with the dull times of 1842, which were followed by several years of great manufacturing activity.[144] Shortly before 1850 the experience of 1829 and 1834 was repeated; factory-building outstripped both crops and

[141] Wallis, *Special Report on the New York Industrial Exhibition of 1853*, 7–8.
[142] U. S. Census 1840, *Compendium*.
[143] U. S. Census 1860, *Manufactures*, xxi.
[144] *Bagnall Papers*, II, 1665; *Farmer and Mechanic*, II, 81, Feb. 17, 1848; DeBow, *Industrial Resources*, I, 218.

COTTON SPINDLES IN 1839

Plate 5 is based upon the published census figures for 1839. Returns of textile machinery in early enumerations are known to be defective, and the statistics here used are to some extent conjectural. Therefore the symbols on the map indicate only approximately the number of spindles in a county, though they are sufficiently exact to show the general geography of cotton manufactures. However, both the census and the map erroneously credit Green County, Georgia which had less than 5,000 spindles, with over 25,000 spindles. An attempt to compute county totals from the original schedules even of the census of 1860 proved impossible on account of obvious errors and omissions in the reports of enumerators. The number of spindles in a county is not an index to the number of mills, on account of the varying size of establishments in different parts of the country. As a rule mills were largest in areas of greatest spindle density.



COTTON SPINDLES IN 1839

ALBION COLLEGE

markets; cotton prices soared while the price of yarn and cloth remained stationary or declined, and the margin of manufacturing profit disappeared.[145] For the next ten years the industry was for the most part prosperous, but its condition was rendered precarious by heavy imports of prints and print-cloths under the Walker tariff, and by the financial uncertainties that culminated in the crisis of 1857. Particularly in New England this was a time of industrial malaise and self-criticism. However, the number of spindles at Lowell rose from 300,000 in 1850 to 400,000 in 1860, and the number of looms from 9000 to 12,000.[146] The Lonsdale Company, in Rhode Island, started the decade with $250,000 capital, and paid during these ten years $680,000 in dividends, besides adding about $500,000 to its undivided earnings.[147] In New England spindle capacity rose 40 per cent; and in the country as a whole the value of cotton manufactures increased more than three-fourths.[148]

No epoch-making inventions, no new phases of organization, and no important changes in location characterize this period. The growing efficiency of machinery caused the number of operatives to increase more slowly than the number of spindles, and much slower than the quantity of cloth made; but the supply and distribution of labor remained as it had been since 1820.

In the South the most striking feature of this period was the gradual breaking down of a traditional antipathy to manufactures. This hostility was opposed to the obvious interests of a region where idle white labor, abundant raw materials, and ever-present water-power seemed to unite conditions so favorable to textile industries. Cotton-planting engaged the labor of the negro and the thought and capital of a directing white class, but the natural operatives of the South remained unemployed, and the capital of the North and of Europe was mobile enough to flow to the point of maximum profit without regard to sectional or national lines, were such a profit known to be assured by southern factories.

Slavery as a system possibly had less direct influence upon manufactures than is commonly supposed, but the presence of the negro through slavery was important. As shown by the effect continuing after emancipation, white immigrants avoid districts having a large colored population, and during this period much of the mechanical skill of America and many of its industries came from Europe. The negroes were grouped in isolated plantation communities whose primitive economic needs enabled them to dispense with good roads and

[145] *Hunt's Merchants' Magazine*, XXI, 631–632, Dec. 1849; Baird, *American Cotton Spinner*, 25, 248, 249; *DeBow's Review*, XIV, 299, Mar. 1853; Appleton, *Introduction of the Power Loom*, 31; also in *Hunt's Merchants' Magazine*, XXXIX, 670, Dec. 1858; *cf. Western Journal and Civilian*, V, 73, Nov. 1850.

[146] Baird, *American Cotton Spinner*, 16–17; Wallis, *Special Report on New York Industrial Exhibition of 1853*, 69; *DeBow's Review*, XXV, 113, July 1858.

[147] Brown and Ives, *Papers*.

[148] DeBow, *Industrial Resources*, I, 220; U. S. Census 1860, *Manufactures*, xxi.

active local intercourse. They thus interposed a physical as well as a social barrier, separating the small farmers of the highlands, who otherwise might have built up manufactures, on the one hand from the sea and on the other from the industrial States to the northward. A large colored servile population curtailed consumption and limited the market for middle-grade goods that form the bulk of factory output. Moreover, agriculture carried on by black labor was based on credit in the form of advances from factors, and these middlemen, who also handled both the cotton and the imported merchandise of planters, by these three operations drew into their own pockets most of the profit from that crop. They directed capital to the industry from which they derived their gain. Finally, until the abolition of the corn laws in England, the economic ties between the mother country and the Southern States were as intimate, and as distinct from the relation of the Northern States to England, as they had been during the colonial period. Great Britain, as we have seen, either prohibited the importation of American cereals, lumber, provisions, and other northern staples, or burdened them with such heavy duties that they were unremunerative, while in response to the demands of her manufacturers, who bought our cotton in any case, she rapidly lowered the duties on that article, and at length abolished them altogether. Consequently, in the commerce of the South there was a reciprocity with this most important of trading nations which did not exist in the North and West, a condition which was unfavorable to manufactures in the cotton States and favorable to them in the other sections of the country. These business interests, supported by social traditions and political sectionalism, were strengthened in their opposition to new industries by a widespread popular prejudice against organized manufactures, such as had been at one time common to a larger part of the Union.

Nevertheless the South chafed continually under the discomfort of an ill-balanced system of production, and long before the Civil War its thinking men were groping, with ever clearer vision of their value, towards diversified industries and greater economic independence. During the height of the tariff controversies, between 1824 and 1833, the people of the discontented States started to make their own supplies in a sort of non-importation campaign against the North.[149] This movement was doubtless encouraged also by the low price of cotton.[150] In 1827 the Georgia and Virginia legislatures were memorialized to encourage cotton manufactures and to ascertain whether negro labor could be employed in this industry.[151] About that date southern legis-

[149] *Niles' Register*, XXXII, 148, Apr. 28, 1827; *DeBow's Review*, XXIX, 495–498, Oct. 1860; *Documentary History of American Industrial Society*, I, 289; *cf.* Jerome, *History of the American Clock Business*, 55.

[150] John C. Calhoun, *Correspondence*, American Historical Association, *Annual Report*, 1899 264, letter to James Edward Calhoun, May 4, 1828; *Niles' Register*, XLV, 4, Aug. 31, 1833.

[151] *Niles' Register*, XXXIII, 275, Dec. 29, 1827.

latures began to charter industrial corporations, showing that the prevailing prejudice against that form of business was relaxing.[152] A legislative committee in North Carolina, in reporting upon the encouragement of manufactures and wool-growing, called attention to the advantage of a liberal corporation policy.[153] Ten years later a Virginia committee reported upon the extent and practicability of manufactures in that State.[154] In 1840 North Carolina spinners were summoned to a convention at Raleigh, partly to regulate the yarn market, but also with a view to promoting cotton manufactures.[155]

In the middle forties, when their crop hardly repaid the expense of cultivation, Carolina planters feared that a permanent low price-level for cotton, caused by reduced cost of production in the new Southwest, might drive them out of business. They hoped to compensate for this by employing their slaves in factories.[156] The Southwestern Convention, held at Memphis in 1845, which was addressed by John C. Calhoun, appointed a committee on manufactures and resolved that planters ought to invest in local manufacturing enterprises.[157] In 1847 Georgia appointed a legislative committee to report on the progress of manufactures and enacted a general corporation law for manufacturing companies.[158] In 1851 southern manufacturers met in a convention at Richmond to consider measures for promoting industrial interests.[159] Another southern convention, held at Memphis in 1853, directed a committee to advertise, particularly in the manufacturing districts of Europe, the peculiar advantages of the South for cotton factories.[160] The next year a convention at Charleston, attended by several governors, advised the appointment of State committees on manufactures.[160] Georgia exempted certain manufacturing plants from taxation and proposed similarly to exempt the stock of industrial corporations, and some southerners advocated bounties for such enterprises. Doubtless convention resolutions were to some extent perfunctory and had more political than economic import, but they were backed by a real movement that, particularly in the industry we are now considering, declared itself by actual results.[161]

[152] *Niles' Register*, XXXIII, 355, Jan. 26, 1828; XXXV, 401, Feb. 14, 1829; XLV, 83, Oct. 5, 1833.

[153] North Carolina, *Report on the Subject of Cotton and Woolen Manufactures and the Growing of Wool.*

[154] *Niles' Register*, LIV, 323, July 21, 1838; *cf.* Bruce, *Rise of the Iron Industry in Virginia*, Chap. VI.

[155] *Niles' Register*, LVIII, 230, June 13, 1840. No account of such a convention appears in Raleigh papers of this date.

[156] *Southern Quarterly Review*, VIII, 118, *et seq.*, July 1845.

[157] *Report of the Southwestern Convention; cf.* Cole, *The Whig Party in the South*, 94–96, 208–210.

[158] *Farmer and Mechanic*, II, 31, Jan. 20, 1848; *Scientific American*, III, 149, Jan. 29, 1848; *DeBow's Review*, V, 189, Feb. 1848; *Savannah Georgian*, Nov. 5, 1847; *Columbus Enquirer*, Dec. 28, 1847.

[159] Baird, *American Cotton Spinner*, 25.

[160] *De Bow's Review*, XV, 268, Sept. 1853; XVI, 635, June 1854; XVII, 257, Sept. 1854; Southern Cotton Spinners' Association, *Transactions*, 1900, 150–151.

[161] *Hunt's Merchants' Magazine*, XIV, 153, Feb. 1846; XXI, 461, Oct. 1849; *Western Journal and Civilian*, III, 95–106, Nov. 1849; *American Quarterly Review*, III, 408–410, Dec. 1849; IV 278–280, July, 1850.

Until after 1830 the small yarn mills, of which several already have been mentioned south of Virginia, were owned either by operative proprietors or by individual planters. The first incorporated companies in South Carolina, started about 1833, afforded a more dignified entrance to manufacturing than these small enterprises, which carried with them workshop associations, and therefore they were more attractive to planters who could not devote a large capital or considerable time to such undertakings. But their promoters, lacking the broad commercial outlook of a trading-people, undertook to supply only local consumption, and thus duplicated the function of existing spinning mills.[162] The latter, some of which worked both cotton and wool, continued to multiply until 1850, after which many either grew into larger undertakings or were supplanted by them. They were so well protected from outside competition by their isolation in a half-developed country, and were so economically managed by their semi-artisan proprietors, that they held their markets. Not only did they control the southern yarn trade, but about 1840 they set up looms and drove northern osnaburgs for a time from southern commerce.[162] They also manufactured tickings, Georgia stripes and plains, and other imitations of local homespuns.[163] The competition they encountered came from the North rather than from Great Britain, and a substratum of trade antagonism accentuated their hostility to the big corporations and protected industries of that section.[164] Soon, however, the owners of these small mills, and the planter corporations that had attempted without manufacturing or commercial experience to duplicate in South Carolina the factories of Rhode Island, were reënforced by a third and better-instructed group of industrialists. These were recruited from merchants in southern cities, who began to see large trade profits in cotton factories.

Among these men the most prominent was William Gregg, who had retired from business in Columbia and by chance had been called upon to operate for a short time a factory at Vaucluse. He made a personal study of the Massachusetts system of manufacturing and became convinced that it could be transplanted successfully to the South. Gregg was a nephew of one of the earliest cotton-spinners of Georgia, who had operated a small mill on the Little River in that State soon after 1810. Possibly from this source he had acquired mechanical traditions, which he combined with the commercial instinct of a successful merchant. One of his earlier services to southern industry was to secure the repeal of an ordinance prohibiting steam-engines in the city of Charleston. He actively combated the prevailing prejudice against manufactures by showing that the failure of the ambitious enterprises of the early thirties was due to easily remedied faults of plan and management.

[162] Gregg, *Domestic Industry*, 50–51; 38, 43.
[163] *DeBow's Review*, XXIX, 625–630, Oct. 1860.
[164] This was true also in the West; Michigan; *Report of the Committee on Agriculture and Manufactures*, 4, *House Doc.* 1, 1844.

His writings did much to correct the popular impression that a manufacturer must be a mechanic and suffer the social disabilities of a manual worker. He thought it necessary to inform his readers that Lowell mill-owners and superintendents wore gloves and lived in fine residences. He pointed out lucidly the advantage Massachusetts factories derived from their perfected commercial organization, skilled superintendence, and specialized production. But chief of all he was not a mere theorist. In 1846, in association with Charleston capitalists, he founded at Graniteville, 10 miles from Augusta in South Carolina, where water-power, water navigation, and railways met, the finest and probably the largest factory in the South, with 9,000 spindles and 300 looms. His machinery, driven by a turbine-wheel of 116 horse-power, was devoted exclusively to making the sheetings and heavy cotton fabrics that have since been the staple fabric of the South. His operatives were native whites, who were housed, shepherded, and schooled in a comfortable village, with welfare institutions, on the Lowell plan. Thereafter Gregg's spindles as well as his pen were active in demonstrating the truth of his view of southern industrial opportunities.[165]

Almost immediately a power canal was dug at Augusta, and even larger factories were erected at that city.[166] Columbus became a cloth-making center.[167] Steam mills were built at Charleston, Mobile, New Orleans, and Memphis, which though not always successful indicated the disposition of conservative southern cities to depart from exclusively commercial traditions.[168] Before the middle of the century the manufacturers of that section began to follow up their earlier yarn shipments to New York and Philadelphia with consignments of sheeting and other coarse cloth, and Georgia yarn was sent even to China.[169] Though some large undertakings were wrecked by the financial crisis of 1857, more from weak banking support than from faults of operation, modern cotton manufacturing in the South dates from the founding of Graniteville rather than from the post-bellum period. Even before 1840 families that are still prominent in this industry had started mills in the Carolinas, and indeed one such family was recently still employing several factories upon plaids, which originally suited the traditional Scotch and Irish tastes of the southern highlands.[170]

[165] *Farmer and Mechanic*, II, 475–476, Oct. 5, 1848; *DeBow's Review*, VI, 370, Oct.–Nov. 1848; VII, 456–457, Nov. 1849; XI, 136, Aug. 1851; XVIII, 777–780, June, 1855.

[166] *DeBow's Review*, VII, 457, Nov. 1849; XXV, 724, Dec. 1858; *Hunt's Merchants' Magazine*, XXVI, 257, Feb. 1852.

[167] *Hunt's Merchants' Magazine*, XXIII, 247, Aug. 1850; also in *DeBow's Review*, IX, 430, Oct. 1850; Olmsted, *Seaboard Slave States*, 547–548; *Sen. Doc.* 72, 62d Cong., 1st sess., Part III, 1870

[168] Charleston, *Farmer and Mechanic*, II, 597, Dec. 14, 1848; *Hunt's Merchants' Magazine*, XX, 115, Jan. 1849; *DeBow's Review*, VII, 398, Oct. 1849; Mobile, *Hunt's Merchants' Magazine*, XXIII, 346, Sept. 1850; *DeBow's Review*, IX, 432, Oct. 1850; XXII, 111, Jan. 1857; New Orleans, *Standard History of New Orleans*, 516; *DeBow's Review*, XXV, 115, July 1858; Memphis, *DeBow's Review*, VIII, 462, May 1850; *First Memphis Directory*, 1850, 112.

[169] Graniteville Manufacturing Company, *Fifth Annual Report*, in *DeBow's Review*, XVIII, 777–779, June 1855; XI, 322, Sept. 1851; *Hunt's Merchants' Magazine*, XXXI, 384, Sept. 1854; *Scientific American*, III, 149, Jan. 29, 1848.

[170] *Industrial South*, VI, 372, Sept. 1886.

The site of most of these enterprises continued to be in the tier of counties along the fall-line of rivers, where power and navigation joined, although railways were already beginning to modify this distribution. The James, the Savannah, the Chattahoochee, the Alabama, and the Tennessee were the principal streams of the cotton States that afforded both power and transportation to distant markets; and near the head of navigation upon these rivers, at Richmond and Petersburg in Virginia, Augusta and Columbus in Georgia, at Huntsville, Florence, and the mill villages near Montgomery in Alabama, rose southern manufacturing centers that fed the larger commerce of the country.

However, viewed in comparison with the cotton manufactures of the North, those of the South were still insignificant. In 1860 New England had nearly 14 spindles for every one south of Mason and Dixon's line. Southern spindles numbered 290,000 compared with 5,236,000 in the whole country; and they did not equal by over 100,000 the number running in the single city of Lowell. Nevertheless, the present attainment of the industry assured its indefinite future growth, and ultimate national importance.

No such promise cheered the cotton manufacturers of the West. In 1850 the mills of the Ohio Valley contained about 90,000 spindles, or more than they did ten years later.[171] Pittsburgh, with seven steam factories, operated some 34,000 spindles; Cincinnati and its suburbs across the river had two-thirds that number.[172] The only large enterprise outside these cities was at Cannelton, Indiana, where Louisville capitalists were just starting a steam factory of over 10,000 spindles.[172] St. Louis had a single mill employed mostly in making yarn.[173] Even in 1860 one-half the cotton manufactures of the South and West were marketed in the latter form.[174] Such cloth as was made was coarse and substantial, resembling typical New England fabrics of forty years before. Georgia was the leading cotton-mill State south of Pennsylvania,[175] and in general the trend of this branch of manufacturing was either towards greater centralization at certain points in the North or towards the regions where most cotton was grown. In the intermediate zone the industry remained stationary or declined.

New England increased its spindles during these twenty years both absolutely and relatively faster than other parts of the country, and this growth was particularly notable in Maine and New Hampshire, whose large water-powers continued to be harnessed to new textile

[171] *Hunt's Merchants' Merchants' Magazine*, XXIII, 244, Aug. 1850; U. S. Census 1860, *Manufactures*, XXI.

[172] *Hunt's Merchants' Magazine*, XVII, 593, Dec. 1847; *Western Journal and Civilian*, V, 57–58, Oct. 1850; XXIII, 244, Aug. 1850; XXV, 642, Nov. 1851; XXXVIII, 640, May 1858; *De Bow's Review*, XVIII, 407, Mar. 1855; DeBow, *Industrial Resources*, II, 122.

[173] *Western Journal and Civilian*, I, 229, Apr. 1848, II, 69, Jan. 1849; Green, *St. Louis Directory*, 1845, xix; *Hunt's Magazine*, XXIII, 245, Aug. 1850; Hogan, *Thoughts about St. Louis*, 55.

[174] U. S. Census 1860, *Manufactures*, XXI.

[175] *Cf.* Kittell, *Southern Wealth and Northern Profits*, 63–64.

machinery. During this period Lawrence and Holyoke were added to our manufacturing cities, and the older towns upon the Merrimac increased their mills and equipment. Moreover, soon after 1840, when railways, larger vessels and the general centralization of business enabled Boston to absorb the over-sea commerce previously distributed among smaller ports, Salem, Newburyport, and Portsmouth erected steam cotton mills to employ their idle capital and labor. No water-power limitations hampered the size of these establishments, and they were designed with large capacity in order to realize the economies of wholesale production. In 1850 the Naumkeag factory at Salem operated 31,000 spindles, the factory at Portsmouth over 21,000, and Newburyport, whose first steam cotton manufactures date from 1836, was the home of four companies, whose combined machinery amounted to nearly 60,000 spindles. The Portsmouth mill spun fine mule-yarns, of numbers between 70 and 90, which it wove into lawns.[176]

Steam also began to supplement water-power in the spindle-saturated districts of Rhode Island and southeastern Massachusetts, with the result that factories in this region became larger. As fine spinning increased, climate had more influence on the geography of cotton manufacturing, and the superior adaptation of the humid south-shore county to this pursuit became manifest. Fall River already gave evidence of its future prominence, though it hardly promised before the Civil War ultimately to succeed Lowell as the largest spindle center in America.

In Connecticut and New York power-knitting, though it used only 4 per cent of the cotton yarn produced, fostered spinning; and Cohoes, where water-power first was applied to this manufacture, became a center for hosiery and underwear. Of the States outside New England, Pennsylvania showed the greatest increase of machinery and, considering all materials and fabrics, Philadelphia remained our leading textile city. In 1860 its markets received the yarn from over 400,000 cotton-spindles, of which 200,000 were in the city and suburbs and the remainder in tributary districts.[177] The largest factory in Philadelphia itself had 27,000 spindles and 900 looms; but just across the Delaware the Washington Mills used 36,000 spindles and 800 looms to make calicoes for the Gloucester Print Works.[178] Nevertheless hand-weaving still employed the service of 3,000 operatives on cotton goods alone. Some 25 weaving-masters controlled 1250 hand-looms, while journeymen weavers and their families operated several hundred more in their homes.[179]

In 1860 the seventy years that had elapsed since power spinning was introduced in America still lay within the compass of an old man's

[176] *Hunt's Merchants' Magazine*, XIV, 153–154, Feb. 1843; XLI, 436, Oct. 1859; *American Textile Manufacturer*, I, 139, Aug. 1880.

[177] *Hunt's Merchants' Magazine*, XLIII, 559, Nov. 1860; XLV, 16, July 1861.

[178] Freedley, *Philadelphia and Its Manufactures*, 251.

[179] Freedley, *Philadelphia and Its Manufactures*, 253–255. New England sold yarns to Philadelphia weavers and bought special fabrics from them. For an account of the regional characteristics of the industry at this time, and the Boston marketing system, see Boston Board of Trade *Report on the Branch House System*, 4, 9–11.

memory, and pioneers survived to tell the history of our earliest mills. Meanwhile the cotton industry had become our leading branch of manufactures in capital and labor employed and in net value of product. Great Britain, indeed, had nearly six spindles to our one; but we stood second to that country, and for more than thirty years had been its principal rival in foreign markets. Americans had contributed largely to the mechanical improvements of this period and to the betterment of factory organization and discipline. Several new and useful fabrics had been devised by our operatives and superintendents. The consumption of cotton had increased from 5,000,000 to 423,000,000 pounds or more than 8 times as fast as the population. Until 1820 numbers higher than 20 were rarely spun, and our standard fabrics were of 14 yarn; in 1860 lawns of a fineness approaching 90 were the principal product of at least three large factories, and the domestic market for this grade of goods was being won by our manufacturers. But conditions in America still limited attention mainly to useful and substantial fabrics, rather than those light goods of ornamental weave and coloring that were the specialty of many European looms.[180] Of these durable goods our people were the largest users in the world, and in their production it is doubtful if we were excelled by any other country.

WOOL AND MIXED CLOTHS

The manufacture of woolens and mixed cloths as a specialized industry originated later in America than that of cotton and had a less prosperous history. Its raw materials, as we have seen, were only partly produced in this country and never were superabundant. A transition from household to factory spinning was not assisted by a simultaneous change of spinning fibers, as in the case of the substitution of cotton for flax. Woolens are made by more complex processes than cotton goods and require experienced operatives, not only to make cloth but also to dye and finish it; therefore it took longer to perfect automatic machinery for working wool than for working cotton, and this manufacture did not afford so large a field for the employment of unskilled labor and the use of power—two conditions essential for successful competition with Europe. Woolens were used principally for apparel, and mainly for those forms of clothing where taste and fashion govern popularity; consequently they were at a maximum disadvantage in rivalry with foreign fabrics. Many cotton goods were employed where superficial qualities had little influence on consumption; and indeed among our first successful woolen manufactures were flannels and knitting-yarns, which resembled sheetings and tickings in their unostentatious uses. Finally, the prosperity of this industry was peculiarly at the mercy of tariff laws, which played no minor part in its vicissitudes.

[180] *Cf.* Wallis, *Special Report on New York Industrial Exhibition of 1853*, 14.

In 1790, when Slater began to spin cotton at Pawtucket, there were a few struggling woolen manufactories in America, of which the largest and most ambitious was at Hartford. None of these used power machinery except for fulling, and probably none used jennies.[181] The Hartford manufactory put its wool out to be spun in families.[182] In 1793 John and Arthur Scholfield, two Yorkshire operatives, immigrated to Massachusetts, and after making broadcloths at Charlestown for a few months were assisted by Newburyport capitalists to erect a small factory at Byfield. Here they installed what is supposed to have been the first wool-carding machine driven by water in America. They spun and wove by hand on jennies and spring-shuttle looms, and shared their buildings and their water-power with a nail factory.[183] Jennies were possibly installed in a woolen mill at Ipswich the previous year, and about the time the Byfield factory was built water-power cards were running at Hartford.[184] Two years later a woolen mill with English machinery, possibly carding and spinning by water-power, was started at Elkton, Maryland.[185] The Scholfields left Byfield, and before the end of the century had a small mill at Montville, Connecticut.[186] There was another mill at Manchester, in the same State;[187] and in 1798 two young Englishmen were making woolens, probably with improved machinery, at Lebanon, New Hampshire.[187] So precarious was the life of these establishments, and so intermittent their operations, that it has been doubted whether in 1801 a single woolen mill was running in New England. Nevertheless, all of our domestic clip was manufactured at home and several carding-machines on the Scholfield model were preparing wool for household spinning-wheels.

During the next ten years the number of places where jennies and looms were operated in connection with carding and fulling mills considerably increased. Importers and breeders of Merino sheep established some of these, and made fine goods from their materials. Other mills for the most part produced coarse cloth from native and Iceland wool. Without attempting to enumerate all the enterprises started at this time—for such a list probably would be incomplete, and in any case would not describe the condition of the industry—in Connecticut, John Slater built a mill at Stonington, and General Humphreys, the pioneer Merino breeder, erected a small factory at the

[181] *E.g.*, Bentley, *Diary*, I, 158, Apr. 5, 1790; *Pennsylvania Gazette*, Apr. 21, 1790; *Bagnall Papers*, II, 1139–1140.

[182] Letter of Elisha Colt, Aug. 20, 1791, in *Hamilton Papers*, Library of Congress.

[183] Bagnall, *Textile Industries*, 202–204, 207–208; Rhode Island Society for the Encouragement of Domestic Industry, *Transactions*, 1870, 40–41; Bentley, *Diary*, II, 95, June 18, 1794; II, 196, Sept. 2, 1796.

[184] Rhode Island Society for the Encouragement of Domestic Industry, *Transactions*, 1861, 85–86, Felt, *Ipswich*, 100; Bagnall, *Textile Industries*, 107, 196; Wansey, *Excursion to the United States*, 260.

[185] *Maryland Journal*, cited by Ebelings, *Erdbeschreibung von Amerika*, V, 417; Johnson, *History of Cecil County*, 382–383; Bagnall, *Textile Industries*, 232–236; *cf. Maryland Herald*, June 2, 1795; *Maryland Journal*, Mar. 7, 1796.

[186] Rhode Society for the Encouragement of Domestic Industry, *Transactions*, 1870, 41.

[187] Bagnall, *Textile Industries*, 227–229, 270; *cf. Pittsburgh Gazette*, Feb. 28, 1789.

village which bears his name.[188] At Peacedale, Rhode Island, a fulling mill was developing into a manufacturing plant.[189] In addition to several small undertakings in eastern Massachusetts, Arthur Scholfield, who had settled about the beginning of the century in Berkshire County, was manufacturing broadcloths at Pittsfield.[190] About 1807 George Booth, an Englishman with whom Moses Brown, of Providence, was in correspondence, had a factory at Poughkeepsie, and sold his goods in the Albany market.[191] A few small establishments of doubtful equipment were running near Philadelphia, Wilmington, Frederick, and Baltimore;[192] and the factory at Elkton continued in operation. The census of 1810 gives no intelligible account of the woolen mills in the country, but in the Gallatin report, issued as a preliminary to the census, there is a manifestly incomplete list of 14 mills and manufactories supposed to be on a par with the 87 cotton mills whose returns are tabulated.[193] Evidently non-intercourse had by no means stimulated this industry as it had the manufacture of cotton—principally because the pressing needs of the country were met more adequately by homespuns.

During the second war with England these manufactures grew rapidly; in 1816 it was estimated that $12,000,000 was invested in woolen mills, and that their annual product was worth $19,000,000.[194] Connecticut held a position in this industry similar to that of Rhode Island in cotton-spinning. In 1811 the factory at Humphreysville, which used improved machinery and employed 150 operatives, was the largest and best-equipped in the country.[195] That year a steam factory went into operation at Middletown, which during the war was a leading producer of fine merino broadcloths.[196] When peace came

[188] Rhode Island Society for the Encouragement of Domestic Industry, *Transactions*, 1870, 41; Bagnall, *Textile Industries*, 347–352; North, *New England Wool Manufacture*, in National Association of Wool Manufacturers, *Bulletin*, XXIX, 245, Sept. 1899.

[189] Bagnall, *Textile Industries*, 285–286.

[190] Rhode Island Society for the Encouragement of Domestic Industry, *Transactions*, 1870, 41–44; Bagnall, *Textile Industries*, 260; *Bagnall Papers*, II, 1066; *cf.* Ebelings, *Erdbeschreibung von Amerika*, I, 323, quoting *Columbian Magazine*, 1790, II, 202.

[191] *Pittsfield Sun*, Apr. 16, 1807, quoted in Bagnall, *Textile Industries*, 486; *Niles' Register*, I, 390, Jan. 25, 1812; Almy and Brown, *Manuscript Letter Book*, letter Mar. 26, 1810; Smith, *History of Duchess County*, 463; Platt, *History of Poughkeepsie*, 83, 84, 85.

[192] Advertisement of George M. Conradt in *Bartgis's Republican Gazette*, Nov. 24, Dec. 8, 1810; advertisement of William Norris in *Federal Republican and Commercial Gazette*, Dec. 25, 1809.

[193] *American State Papers, Finance*, II, 434; *cf. id.*, 691; North, *New England Wool Manufacture*, in National Association of Wool Manufacturers, *Bulletin*, XXIX, 252, Sept. 1899.

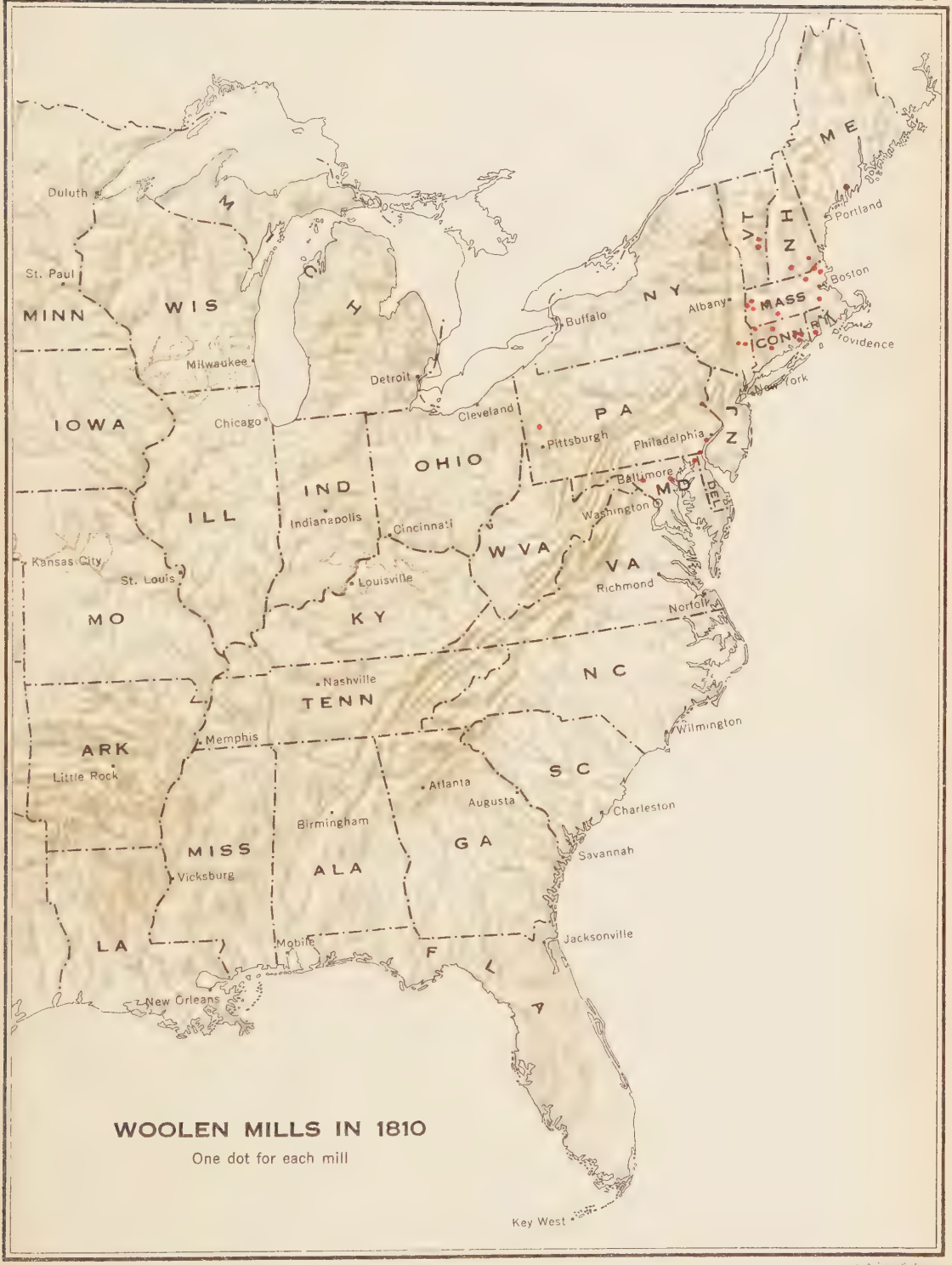
[194] *American State Papers, Finance*, III, 104.

[195] North, *New England Wool Manufacture*, in National Association of Wool Manufacturers, *Bulletin*, XXIX, 245, Sept. 1899.

[196] *Niles' Register*, I, 406, Feb. 1, 1812; III, 173, Nov. 14, 1812; North, *New England Wool Manufacture*, in National Association of Wool Manufacturers, *Bulletin*, XXIX, 253, Sept. 1899.

WOOLEN MILLS IN 1810

Plate 6 shows the location of all the known woolen mills in the United States that were using improved machinery in 1810. It is based upon data in Gallatin's *Report on Manufactures* and in Bagnall's *Textile Industries of the United States*, but the information these afford has been supplemented from contemporary newspapers and gazetteers, and from local histories and other sources. Several mills of later importance, such as that of the Oriskany Manufacturing Company in Oneida County, New York, and the steam factory at Middletown, Connecticut, went into operation in 1811.



WOOLEN MILLS IN 1810

One dot for each mill

ALBION COLLEGE
LIBRARY

Connecticut had 25 mills, employing directly 1200 operatives and making annually 500,000 yards of woolen cloth. In that State the production of factory goods was thought to equal that of homespuns.[197] Many mills were in operation also in other parts of New England and in the Middle States. Factories had been built as far south as Virginia[198] and as far west as Lexington and Cincinnati. Both of the latter cities, as well as Pittsburgh and Steubenville, had steam woolen mills.[199] The Steubenville factory was for some years one of the most prominent manufacturing establishments in the West, and sold its goods even in eastern markets.[200]

This Ohio enterprise, General Humphrey's mill, those of du Pont near Wilmington, of Rapp at Harmony in western Pennsylvania, of Crowinshield at Danvers, possibly the one of Booth at Poughkeepsie, and others in New England and New York State, were associated with the importation of Merino sheep. They made a specialty of fine broadcloths, for which prices reaching $10 and $12 a yard were obtained during the war. The daily output of one of the larger mills of this class, at Northampton, which employed 50 hands and operated with a capital of $50,000, was only 22 yards of superfine broadcloth.[201] At the same time many mills employing coarser varieties of wool were engaged in making blankets and army cloths for the government, which was a demand that the homespun industry could not supply, and that in spite of the preference given to domestic manufacturers was filled in part by costly, precarious, and unpopular purchases of British woolens.[202]

Simultaneously the war gave a stimulus to household manufactures, and the family loom even reappeared in Salem, where it had not been seen for a generation. It became fashionable to knit the underwear of both sexes, and with the substitution of trousers for knee-breeches, socks took the place of the long stockings formerly worn by men.[203] Some woolen mills had knitting-frames as well as looms. Hosiery yarns for domestic use were mostly spun in families. Mill-looms were operated in the establishment itself or its immediate vicinity, and not, as in case of cotton, in distant neighborhoods. This was partly because the woolen industry did not grow rapidly enough to call for more than local household labor, partly because it competed directly with still vigorous homespun manufactures, and partly because cloth made by mills was usually fulled and finished in the same establishment. Meanwhile the change in men's clothing affected the market for woolen cloth. Hitherto trousers had been worn only by seamen and laborers, and

[197] *American State Papers, Finance*, III, 104.

[198] Howells, *Life in Ohio*, 7–8.

[199] Kayser, *Commercial Directory*, 54–55; *Documentary History of American Industrial Society*, II, 30; *Niles' Register*, VII, 339, Jan. 28, 1815; VIII, 452, Aug. 19, 1815; IX, 35–36, Sept. 16, 1815; Blowe, *View of the United States*, 521–522; Philadelphia Society for Promoting Domestic Industry, *Addresses*, 242.

[200] *Niles' Register*, XXI, 367, Jan. 2, 1822.

[201] Dickinson, *A Geographical and Statistical View of Massachusetts Proper*, 64.

[202] Bishop, *History of American Manufactures*, 194–195; *American State Papers, Finance*, II, 816–818.

[203] Bentley, *Diary*, IV, 218–219, Dec. 2, 1813.

they were usually made of heavy linen or of cotton duck or denim, like the over-garments of workmen at the present time. When men engaged in less laborious occupations substituted them for knee-breeches, the disappearance of this class distinction in apparel encouraged a wider use of cloth that combined the wear of a working garb with the appearance of finer clothing.

Shortly before 1810 such a fabric was introduced in New England, and, like sheeting in the cotton industry, it favored mill manufacturing. This was satinet, which was made of cotton-mill warps and of a woolen filling so overlying the former as to produce a cloth that could be finished like an all-wool fabric. These goods originally were substantial, and they speedily displaced serges and cheap cassimeres for outer garments of medium grade. They economized our scanty wool supplies by combining them with our abundant cotton; and under later tariff laws they were protected by an interpretation classing them with goods of the latter material subject to minimum valuations when imported.[204] Many mills were devoted exclusively or mainly to their production, and thus realized the economy of specialization. They never were made to any extent in households. Probably they were first woven at Canton, Massachusetts, some time before 1810, and by the beginning of that year they were manufactured at Poughkeepsie. They also were made at an early date at Andover, and at Hancock in Berkshire County.[205] After the war so many engaged in their production that this was recognized as a distinct branch of manufacturing, and establishments making them mainly or exclusively were popularly known as "satinet mills."

After 1815 woolen mills suffered severely from foreign competition, like other industrial undertakings fostered by the recent exclusion of European goods. During the next five years many enterprises were abandoned, and others were reorganized and absorbed new capitals in an effort to rescue previous investments, but manufacturers did not start original projects. Carding and fulling mills increased in number and paid good profits to their owners. One or two venturesome operatives embarked in the manufacture of satinets, the branch of the industry least affected by the prevailing depression.[206] During the war three Massachusetts factories, in the neighboring towns of North Andover, Andover, and Billerica, fearing an overproduction of satinets, turned to making flannels, which had been woven previously, but not as a special product.[207] They thus dispensed with the troublesome finishing processess

[204] North, New England Wool Manufacture, in National Association of Wool Manufacturers, *Bulletin*, XXIX, 224, Sept. 1899.

[205] Bagnall, *Textile Industries*, 275, 339; Smith, *History of Berkshire County*, II, 73; Almy and Brown, *Manuscript Letter Book*, letter of Mar. 26, 1810.

[206] *E.g.*, Chelmsford, 1817, *Bagnall Papers*, IV, 2513; Dalton, 1818, McLane, *Report on Manufactures*, I, 156–157; Woonsocket, 1819, *Bagnall Papers*, II, 996.

[207] North, New England Wool Manufacture, in National Association of Wool Manufactures, *Bulletin*, XXIX, 259–260, Sept. 1899; Bagnall, *Textile Industries*, 339–340; *Bagnall Papers*, II, 1109–1111, 1146–1149.

required for other garment cloth, were able to use a convenient local wool, and served a large domestic market. Their business was profitable enough to enable them to continue through the crisis, and at its close this manufacture was well-established in America. Plants incompetently managed and ill-equipped were naturally the first to succumb during the depression, but its stress bore heaviest on factories making fine broadcloths and cassimeres, which were subject to maximum foreign competition. Merino wool fell in value and its production declined. The general effect was to confine the wool manufacture within narrower limits. According to the incomplete but suggestive returns of the census of 1820, the establishments then spinning wool, including a few cotton factories partly engaged in this business, numbered somewhat over 100 and contained 25,000 spindles, of which two-thirds were running. About 1000 looms were reported, but less than 700 were in operation.[208] Even were we to add a considerable fraction to these figures for plants omitted, the total would be a modest one, and there is no reason to suppose that the proportion of idle machinery would be materially changed by complete returns. However, despite its recent misfortunes, the industry had grown faster than the population since the preceding census; and it was on the eve of a more important development than it had yet experienced.

This expansion was due partly to legislative favors, partly to improved machinery, and largely to a general recovery of business and a maturing industrial environment. The tariff has been previously discussed. Though wool-jennies may have been run by water at Elkton about 1796, at Uxbridge in 1813 or 1814, and at Peacedale in 1819, the general introduction of power-spinning lagged through the decade ending with 1830.[209] According to the census, 8 power-looms were employed in a Connecticut broadcloth factory in 1820, and two years later they were in use in Rhode Island and Massachusetts.[210] Therefore, this aid was applied to both spinning and weaving about the same time, and yarn mills did not precede cloth factories as they did in the cotton industry. Meanwhile the Goulding condenser enabled labor to be economized in another process of wool manufacturing. Altogether the technical advances of these years greatly aided mill-owners to compete successfully with both foreign rivals and homespun manufactures.

Some evidence of approaching recovery heartened mill-owners in 1818 and 1819, and the latter year a company with a capital of $200,000 was incorporated in Connecticut to acquire and extend a broadcloth mill at Middletown.[211] At Northampton, Southbridge, and elsewhere

[208] Compiled from *American State Papers, Finance,* II, 29, *et seq.*

[209] *Cf.* 425, preceding; North, *New England Wool Manufacture,* in National Association of Wool Manufacturers, *Bulletin,* XXXI, 256, Sept. 1901.

[210] *American State Papers, Finance,* IV, 57; Cole, *History of Tolland County,* 370; North, *New England Wool Manufacture,* in National Association of Wool Manufacturers, *Bulletin,* XXXI, 278, Sept., 1901.

[211] *Bagnall Papers,* II, 1226–1228.

in New England other factories widened their operations.[212] When the large water-powers on the Salmon River were developed, about the time Lowell was founded, woolen as well as cotton manufactures were established. The Salmon Falls Company began making broadcloths in 1823, producing 40,000 yards annually; and the Great Falls Company in 1825 built a woolen mill in addition to its cotton factories, and soon was making yearly 130,000 yards of the same fabric.[213] At Canton, Massachusetts, the Boston and Canton Manufacturing Company had an annual output of 600,000 yards of negro cloth, and imported 1,000,000 pounds of Symrna wool for its uses.[214] These undertakings were larger and better financed than any that had preceded them, and marked the advent of big corporations in this industry. But as all three enterprises either failed or shortly changed to cottons, the formation of the Middlesex Company at Lowell, in 1830, with $500,000 capital, to manufacture cassimeres on the system already successfully applied in that city to making cotton cloth, more properly begins the continuous history of large woolen corporations.[215] However, for many years thereafter the dispersion of this industry, in small plants and in remote localities, was a characteristic feature of its organization. The decline of wool prices between 1820 and 1830 helped maintain even homespun manufacturing, which was encouraged, as in colonial days, by poor markets for farm produce.[216] As late as 1830 New York manufactured more wool in families than in factories, and in 1845 its annual production of homespun cloths and flannels exceeded 4,000,000 yards.[217] Mill manufacturing probably did not become preponderant even in our older industrial States until the fourth decade of the century.[218]

Most woolen companies earned money between 1820 and 1825, but their losses were serious the following year and their situation remained precarious in 1827.[219] This was when overproduction abroad caused an overflow of surplus goods to America and depressed domestic prices. However, most factories kept in operation, and in 1828, with the prospect of a favorable tariff law, the industry was hopeful. Then came the short but acute crisis of 1829, affecting particularly New England textile mills, and the prostration of coarse wool manufacturing by a

[212] McLane, *Report on Manufactures*, I, 310, 536; North, *New England Wool Manufacture*, in National Association of Wool Manufacturers, *Bulletin*, XXXI, 278, Sept. 1901.

[213] Hurd, *History of Rockingham and Strafford Counties*, 683; McLane, *Report on Manufactures*, I, 580, 638, 648; *American State Papers, Finance*, V, 828, 830; *American Annual Register*, 1826–1827, II, 441–442; *id.*, 1830–1831, VI, 313–314; *Niles' Register*, XXXVI, 130, Apr. 25, 1829; XLVI, 413, Aug. 16, 1834.

[214] Harrisburg Convention, *Proceedings*, 66.

[215] *Bagnall Papers*, IV, 2517, 2521.

[216] *Cf.* McLane, *Report on Manufactures*, I, 664, question 23; 920, question 38.

[217] Household, McLane, *Report on Manufactures*, II, 69; Wright, *Wool Growing and the Tariff*, 86. Factory output, McLane, *Report on Manufactures*, II, 90.

[218] *Cf.*, however, New York Convention of 1831, *Journal, Reports of Committees*, 79.

[219] *Cf. American State Papers, Finance*, V, 599, 718, 813, 818, 819, 821, 826; *Niles' Register*, XXXI, 226, Dec. 9, 1826; XXXI, 289, Jan. 6, 1827; XXXII, 97, Apr. 7, 1827.

heavy duty on raw materials.[220] Many companies failed at this time, among them the large enterprise at Canton.[221]

Business began to revive in 1830; and the following year, when the government made an inquiry into industrial conditions in several States, woolen mills reported normal prosperity. The statistics gathered at this time do not present, either directly or by inference, the extent of this industry; and the rough estimate of its volume made the same year by the New York Convention is evidently erroneous.[222] We know that Rhode Island had 39 sets of double cards running in 22 woolen mills, and New York had 83 sets in 56 of its larger establishments.[223] Altogether the latter State had 202 mills or shops where wool was carded and manufactured, but most of these were too small to be dignified by the name of factories.[223] In the western counties of Pennsylvania more than 60 establishments made woolen cloth, among them a number of plants of medium size. In the eastern part of the State several factories had been in operation since the war, making cassimeres, flannels, and satinets. The average output of 8 such mills in Delaware County exceeded 100,000 yards a year, and others near Philadelphia were about this size;[224] but in the latter city the wool manufacture, like that of cotton, was conducted largely in shops and households. In Ohio, Kentucky, Maryland, Virginia, and New Jersey were several small factories, but their growth and activities promised little for the future local prominence of the industry. Delaware had a couple of thriving mills near Wilmington, dating from early in the century.

Maine and Vermont were making woolens, but not on so large a scale as the New Hampshire factories previously mentioned. Southern New England, particularly Massachusetts and Connecticut, was the main center of this industry. The latter State had about 80 mills and 1700 operatives, while Massachusetts already indicated its lead in this manufacture by nearly 120 mills and over 4500 operatives.[224] In this State were our largest factories, and the best examples of the specialization of fabrics and the localization of their production. The annual output of Massachusetts was between 9,000,000 and 10,000,000 yards, of which more than one-third were flannels and about one-third satinets. Flannel-weaving was centered remarkably in Essex County, which made nearly 3,000,000 yards of this fabric annually;[225] the production of satinets was more widely distributed; while a large part of the broadcloth made in the State was woven in the southeastern

[220] *Cf. Niles' Register*, XXXVI, 266, June 20, 1829; R. Hazard, *Manuscript Letter Book*, letters of Sept. 16, Nov. 8, 1828; and circular letter of May 31, 1829.

[221] *Niles' Register*, XLI, 147, Oct. 22, 1831; McLane, *Report on Manufactures*, I, 376.

[222] North, *New England Wool Manufacture*, in National Association of Wool Manufacturers, *Bulletin*, XXXI, 204–205, June, 1901.

[223] McLane, *Report on Manufactures*, I, 976; II, 91; 90.

[224] McLane, *Report on Manufactures*, II, 202, 393–461; I, 892; compiled from same, 112–577.

[225] See preceding reference; *cf.* also *Niles' Register*, XXIX, 166, Nov. 12, 1825; XXXII, 178, May 12, 1827.

corner of Worcester County. Nearly 10 yards of flannel and satinet were manufactured for 1 yard of broadcloth. Less than 200,000 yards of kerseys and other narrow goods were made, but double that amount of cassimeres was reported. The Middlesex Company had begun their manufacture with an output exceeding 150,000 yards per annum.[226] In Connecticut satinet was the leading fabric, followed by flannels, and after some interval by carpeting and broadcloths.[227]

In Massachusetts but two mills were reported devoted exclusively to spinning wool, and these were small affairs making hosiery yarns. There was no manufacture of blankets in New England, though this had been begun successfully during the war with England and was a branch of the industry that, on account of its technical simplicity, might be expected to thrive in America. It was hampered by lack of cheap foreign wool.[228] Nevertheless, the manufacture survived in western Pennsylvania,[229] and in 1831 blankets of mixed wool and cotton were made by a mill in South Carolina,[230] and Mackinaw blankets were made at Philadelphia and Buffalo.[231] Negro cloths continued to be produced at Canton and also in Rhode Island, but the latter State had not yet specialized in this class of goods. The manufacture of carpets, which began before the colonies were independent and was carried on as a regular industry at Philadelphia and elsewhere shortly after the close of the Revolution, was now prosperous.[232] By 1830 we were said to produce a large share of the medium-priced carpeting used in America.[233] Between 1820 and 1830 mills of considerable size were established at Somersworth, Lowell, Thompsonville, Tariffville, and New Haven.[234] Connecticut made nearly 350,000 yards of ingrain carpet annually, and Massachusetts possibly half this quantity.[235] The manufacture of Brussels carpets had been begun at Lowell.[236] The Somersworth factory, in New Hampshire, had a capacity of 1,300 yards a week, and a company at Jersey City was reported to produce nearly double that quantity.[237] How extensive the industry was in Pennsylvania is not recorded, though there were factories in that State and in Maine,

[226] McLane, *Report on Manufactures*, I, 343.
[227] McLane, *Report on Manufactures*, I, 983.
[228] *American State Papers, Finance*, V, 798.
[229] McLane, *Report on Manufactures*, II, 401, 404, 406, 467, 468, 469.
[230] *Niles' Register*, XLI, 266, Dec. 10, 1831.
[231] McLane, *Report on Manufactures*, II, 84–85; *Niles' Register*, XXXIX, 6, Aug. 28, 1830.
[232] United States International Exhibition of 1876, *General Report, Judges Group* IX, 70–71; Bentley, *Diary*, I, 214, Nov. 22, 1790; *American Wool and Cotton Reporter*, XVI, 816; *Columbian Centinel*, June 18, 1791; Hazard, *Register of Pennsylvania*, IV, 93–94, Aug. 8, 1829; *Massachusetts Magazine*, III, 399, June 1791.
[233] *Niles' Register*, XXXVII, 339, Jan. 16, 1830; *cf.* Pitkin, *Statistics of the United States*, 492.
[234] *Niles' Register*, XXXVI, 130, Apr. 25, 1829; McLane, *Report on Manufactures*, I, 329, 339, 386, 981 (twice), 1014.
[235] McLane, *Report on Manufactures*, I, 983.
[236] *Niles' Register*, 340.
[237] *Niles' Register*, XXXVI, 130, Apr. 25, 1829; XXX, 282, June 17, 1826; XXXI, 116, Oct. 21, 1826.

Maryland, Virginia, and Ohio.[238] Soon after 1820, Brussels and ingrain looms, of the Jacquard type, weaving patterns automatically from perforated cards, were used in large carpet works at Philadelphia. Oilcloth also was made from canvas woven in 21-foot widths at the same establishment.[239] That city owes its subsequent prominence in carpet manufacturing to an immigration of British weavers, mostly from Kidderminster; and, as in case of other textile branches, the industry was organized there upon a small-shop and household basis.[240]

It is usual to regard the revival of 1830 as the time when our woolen manufactures became firmly established.[241] In 1828 some mill-owners thought that except for the higher cost of materials they could make woolens as cheaply as their British competitors. This condition did not apply equally to all kinds of cloth. Since 1816 manufacturers of satinets and flannels had reasonable control of the domestic market. Cassimeres were made securely profitable by loom-inventions perfected in New England and by economies of production adopted from the cotton industry. But some risk attended the manufacture of broadcloth so long as this remained an important fabric.

For the next seven years prosperity was uninterrupted.[242] Between 1831 and 1836 the machinery in Rhode Island and New York more than doubled, and though no figures exist to prove it, the rate of growth probably was as rapid in other States.[243] The largest flannel mill in Pennsylvania increased its carding capacity from 10 to 16 sets.[244] According to a private compilation in 1836, our mills consumed 38,000,000 pounds of wool and contained more than 1,500 sets of machinery, of which one-third were in Massachusetts. New York ranked second in equipment, followed by Connecticut, Pennsylvania, and Vermont.[245] At this time 3 single or 2 double cards, with a billy and 2 jennies for spinning, formed a set.[246] Probably the number of active woolen spindles in the country had multiplied tenfold since 1820. More machinery was used for making satinets than for any other two fabrics combined, and considering that its warps were spun from cotton, this cloth seems to have formed about one-half the product of our mills. Broadcloths,

[238] Pennsylvania: *Niles' Register*, XXI, 148, Nov. 3, 1821; *cf.* also XXI, 213, Dec. 1, 1821; XLV, 217, Nov. 30, 1833; Hazard, *Register of Pennsylvania*, IV, 93–94, Aug. 8, 1829; V, 192, Mar. 20, 1830; IX, 224, Apr. 7, 1832, 336, May 26, 1832. Maine: McLane, *Report on Manufactures*, I, 17. Maryland: *American Journal and Mirror of the Patent Office*, I, 463, Oct.–Dec. 1828; *Niles' Register*, XLV, 83, Oct. 5, 1833. Virginia: *Niles' Register*, XXXIV, 154, May 3, 1828; XXXIV, 362, Aug. 2, 1828; XXXVII, 1, Aug. 29, 1829. Ohio: *Niles' Register*, XLV, 210, Nov. 30, 1833.

[239] Hazard, *Register of Pennsylvania*, IX, 224, Apr. 7, 1832; *id.*, 336, May 26, 1832.

[240] Wallis, *Special Report on New York Industrial Exhibition of 1853*, 31.

[241] Hayes, *American Textile Machinery*, 24.

[242] Wright, *Wool Growing and the Tariff*, 84, Note 2.

[243] McLane, *Report on Manufactures*, I, 976; II, 91; Benton and Barry, *Statistical View of the Woolen Manufacture*, 124.

[244] *Niles' Register*, II, 219; Benton and Barry, *Statistical View of the Woolen Manufacture*, 120.

[245] Benton and Barry, *Statistical View of the Woolen Manufacture*, 124.

[246] North, *New England Wool Manufacture*, in National Association of Wool Manufacturers, *Bulletin*, XXXI, 277, Sept. 1901.

linseys, cassimeres, and flannels ranked in the order named. Jeans and mixed negro cloths were classed as linseys, and three-fourths of the machinery in Rhode Island was engaged in their production.[247]

The largest factories in the country were those of the Middlesex Company at Lowell, which employed 27 sets on broadcloths and cassimeres, and of the Salisbury Company, 30 miles further down the Merrimac, which ran 23 sets on flannels. In the same neighborhood the Amesbury Company operated 12 sets of flannel-cards. The Neponset Company, which had bought the $400,000 plant of the defunct Boston and Canton Manufacturing Company, had 15 sets making various fabrics; a mill at Waterford used about the same amount of machinery to make broadcloths and satinets; and a company at Framingham and another at Thompsonville, Connecticut, had respectively 10 and 12 sets carding wool for carpets. These were all the mills having 10 sets of machinery in New England. The only other factory in America of equal size was the flannel mill of Bancroft and Sons, in Delaware County, Pennsylvania, which had 16 sets. No record exists of the amount of machinery in New York, but the establishments in that State were of moderate extent. The typical woolen mill of the time did not have more than two sets of cards.

This explains why in 1840 the census reported 1,420 woolen manufactories and 2585 fulling mills, though the cotton industry, which employed more than three times as much capital and labor, was confined to 1240 establishments.[248] There had been little growth for the previous four years, on account of the crisis of 1837, though in 1838 and 1840 some mills were profitable.[249] But although this was a period of slackened progress and financial embarrassment, it was also a time of technical improvement. In 1839 the Middlesex Mills began to make fancy cassimeres on the power-looms recently perfected by William Crompton, producing an all-wool fabric that rapidly encroached upon fields of consumption previously held by foreign goods.[250] The manufacture of carpets, which throve with cheap foreign wool and already exceeded 1,000,000 yards in 1834, continued to grow; and in 1840 the first power-loom for weaving ingrains was set up at Lowell.[251] Domet flannels, having a cotton warp and wool filling, were invented at Concord in 1836, and soon were made at other places.[252] Among earlier mixed goods cassinets were important, especially in the Central and Western States. They were woven with a woolen-warp and cotton-

[247] Benton and Barry, *Statistical View of the Woolen Manufacture*, 119, 124.

[248] U. S. Census, 1840, *Compendium*, 360, 361.

[249] *E.g.*, *Sen. Doc.* 72, 62d Cong., 1st sess., Part III, 1771 (Dexter testimony, question 7).

[250] *Memoirs of the Wool Industry*, 31; United States International Exhibition of 1876, *General Report, Judges Group*, IX, 34; North, *New England Wool Manufacture*, in National Association of Wool Manufactures, *Bulletin*, XXXII, 315–316; Dec. 1902; *Bagnall Papers*, IV, 2467.

[251] Pitkin, *Statistics of the United States*, 492; *Bagnall Papers*, IV, 2566–2567; *Memoirs of the Wool Industry*, 29.

[252] United States International Exhibition of 1876, *General Report, Judges Group*, IX, 52.

filling, and probably antedated the spinning of cotton warps. Domestic wool, especially of grades used for making broadcloth, became more plentiful. How early shoddy was made in America is difficult to say. Woolen rags were in request for some purpose—possibly for export—in 1791.[253] Forty years later the first American shoddy mill of which there is definite record started in Ulster County, New York. Shoddy-machines were invented in this country, and the manufacture was not difficult to introduce from abroad; but our spinners did not employ this material largely until the Civil War.[254] The kind of textile machinery used, the high cost of labor, and the sensitiveness of home buyers to impositions by local factories prevented the saving thus effected from compensating higher manufacturing costs and risk to market reputation. Similar conditions accounted for the fact that low-grade cotton and waste were not used in domestics.

Though the revival from the depression following 1837 began soon after 1840, and presumably was assisted by the tariff of 1842, machinery increased slowly before 1845. That year our mills contained some 1800 sets, or not quite 300 sets more than nine years previously.[255] Nevertheless, during the decade as a whole, the woolen industry enjoyed stable prosperity and rapid growth. Within the census interval the capital it employed and the value of its products more than doubled.[256] In the East factories became larger, and through the South and West small mills sprang up to replace the declining homespun manufacture. The latter mills helped to lower the average amount of machinery in an establishment, which remained less than 2 sets in 1845. At the same time plans were under way for the largest woolen factory in the world at Lawrence. Its equipment embraced 89 sets of cards, and its annual output was equivalent to more than 1,000,000 yards of cloth.[257] Massachusetts made little progress in woolen manufacturing between 1837 and 1845, but this did not affect the State's lead in this industry.[258] Its woolen-spindles rose from 113,000 in 1840 to 209,000 ten years later.[259] Rhode Island afforded the most remarkable example of specialization, 73 of the 79 sets of machinery within its borders being employed on jeans and negro cloths.[260] These were also important products of western mills.

About this time three causes combined to decrease the manufacture

[253] *Columbian Centinel*, July 16, 1791; *cf.* Bishop, *History of American Manufactures*, II, 85.

[254] Hazard, *Register of Pennsylvania*, VI, 189, Mar. 1842; U. S. Census 1860, *Manufactures*, xxxiv, xxxv; *cf. Hunt's Merchants' Magazine*, XXX, 135, Jan. 1854.

[255] Graham, *Statistics of Woolen Manufactures*, summarized in North, *A Century of American Wool Manufacture*, 46; also in *Hunt's Merchants' Magazine*, XIV, 105, Jan. 1846.

[256] *Cf.*, however, North, *A Century of American Wool Manufacture*, 41–42.

[257] *Farmer and Mechanic*, II, 337, July 13, 1848; *Hunt's Merchants' Magazine*, XXV, 765, Dec. 1851.

[258] Between 1837 and 1845, the number of woolen mills, including those making carpets and worsteds at the latter date, increased from 192 to 205, and the sets of machinery employed rose from 501 to 514; Massachusetts, *Statistical Tables of Industry*, 1837, 170; *id.*, 1845, 331–333.

[259] *Hunt's Merchants' Magazine*, XXIV, 117, Jan. 1851.

[260] Graham, *Statistics of Wool Manufactures*, 33–39.

of broadcloth. A world-wide change of fashion brought into vogue worsteds and fancy cassimeres, so that in Great Britain and Europe the older fabric lost ground. Crompton's loom so cheapened the production of figured cloths that these competed on equal terms with plain goods. And the tariff of 1846, which admitted woolens at the same rate as wool—thus, on account of waste in manufacturing, levying a higher proportionate duty on the raw material in a yard of cloth than on the cloth itself—necessarily fell heavily on fine-wool manufacturers. But the decline in broadcloth production began before this law was projected. In 1836 broadcloths and cassimeres together employed 522 sets of machinery, and in 1845 they employed but 367 sets. There is little doubt that the falling off was in the former fabric. Nevertheless, 1800 looms were said to be employed on broadcloths when the act of 1846 went into effect; and two years later, though the woolen industry as a whole was "on a better basis than ever before,"[261] the decline in this branch attracted comment.[262] However, that decline did not amount to immediate extinction, since in 1850 several mills still made broadcloths their exclusive product and 5 factories in the Mohawk Valley wove in the aggregate more than 600,000 yards,[263] and even two years later the Middlesex Mills made 3,000 yards weekly. The consumption of these goods did not lessen enough to account for the change that followed,[264] for in 1860 only two factories, in Worcester and Hampshire Counties, Massachusetts, were still engaged in their production.[265]

Until after 1840 lack of combing machinery and absence of long-wooled sheep limited our worsted industry to negligible proportions. Articles of combed wool were minor items in homespun manufactures.[266] Worsted warps were used in some of the cloths made at Hartford in 1794.[267] For thirty years following 1828 worsted yarns are said to have

[261] Randall, *Sheep Husbandry*, 125, quoted by Wright, *Wool Growing and the Tariff*, 114; *cf. Farmer and Mechanic*, II, 42, Jan. 27, 1848.

[262] United States Revenue Commission, *Report*, 1865–1866, 428; *Hunt's Merchants' Magazine*, XIX, 341, Sept. 1841.

[263] *Hunt's Merchants' Magazine*, XXII, 685, June 1850; *cf. Western Journal and Civilian*, I, 195–198, Apr. 1848.

[264] Wallis, *Special Report on New York Industrial Exhibition of 1853*, 16; Rhode Island Society for Encouragement of Domestic Industry, *Transactions*, 1852, 117; *Hunt's Merchants' Magazine*, XXXVI, 372, Mar. 1856.

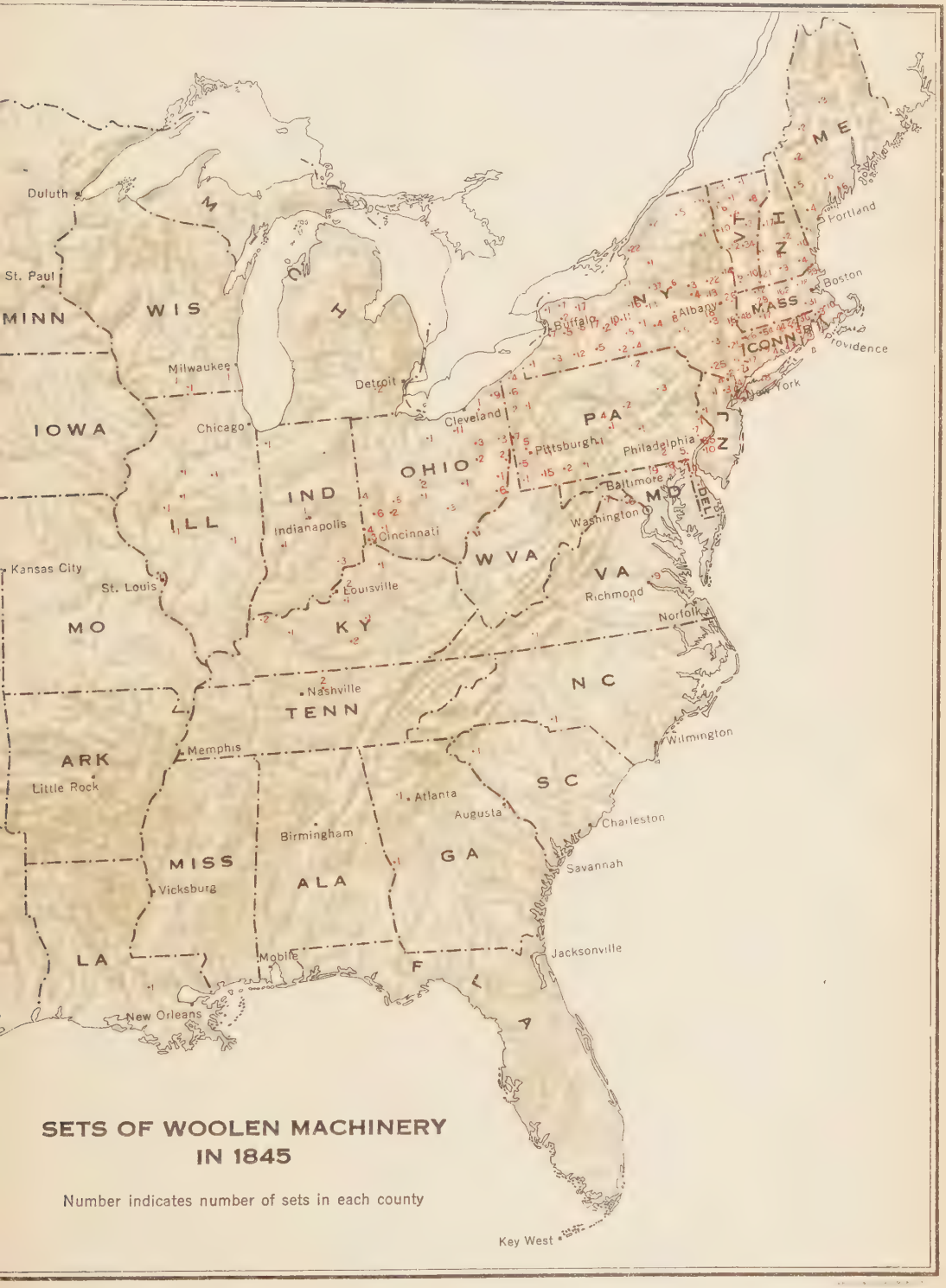
[265] U. S. Census 1860, *Manufactures*, xxxiii.

[266] Wright, *Wool Growing and the Tariff*, 59.

[267] Bagnall, *Textile Industries*, 107; Wansey, *Excursion to the United States*, 261.

SETS OF WOOLEN MACHINERY IN 1845

Plate 7 is based upon Graham's *Statistics of the Woolen Manufactories in the United States.* Each dot indicates approximately the center of a county, and the accompanying figures show the number of sets of machinery in that county. Although Graham's book is entirely a private compilation, it is more complete and accurate than the official statistics of the period. Until after 1860 federal enumerations did not report woolen machinery by counties; and even the totals by States, first published in the volume for 1860, could not have been computed from the defective census schedules. A few miles in the South and West not described by Graham have been located with the aid of contemporary gazetteers and newspapers. Others are known to have existed in that section, but can not be placed. The missing establishments were very small and for the most part were associated with country carding shops and cotton mills. The largest woolen factories were in the regions where machinery was most concentrated geographically.



SETS OF WOOLEN MACHINERY IN 1845

Number indicates number of sets in each county

ALBION COLLEGE
LIBRARY

been spun at Manayunk for Philadelphia knitters and fringe-makers.[268] About 1819 two short-lived attempts were made to manufacture worsted cloths in Rhode Island.[269] In 1822 a spinning mill started at Dedham, that continued for fifteen years to produce annually 1600 pounds of worsted yarn.[270] In 1831 the Lowell Company, which had imported 50,000 pounds of worsted warps the previous year, set up machinery for their manufacture.[271] At Chelmsford there was a worsted mill that supplied noils to a neighboring flannel factory.[272] In 1837 the New England Worsted Company removed its machinery from Lowell to Framingham, where it continued to make carpet warps.[273] The carpet industry accounts for the fact that in 1845 the 10 worsted mills in Massachusetts made over 600,000 pounds of yarn, in addition to 2,300,000 yards of cloth; and that the 6 mills in Connecticut made 154,000 pounds of yarn.[274] By this time combing machinery, of both American and European design, was in use.[275]

Between 1840 and 1860 some alpacas and cashmeres were woven at New England mills, and in the late thirties a fabric of cotton warp and worsted filling was brought to this country from Europe that speedily became the fashion for ladies' dresses. This was mousseline-de-laine, which was made in Massachusetts shortly after 1840 and soon became an article of large production.[276] As it was composed partly of cotton and was printed, this cloth suited New England manufacturing conditions, and it became the special product of large factories, that wove and colored it with great perfection. In 1860 three establishments, all on the lower Merrimac, made 22,750,000 yards of worsted and worsted mixed goods.[277] Braids and fringes of this material were woven at Philadelphia, where European combing machinery had been in operation since 1856.

Before the war the manufacture of blankets, carpets, knit goods, and negro cloths was on a stable basis. Our mills feared no outside competition in flannels, and about 1859 developed the new article of flannel suitings. In 1847 the Middlesex and Bay State companies began weaving shawls, of which the latter at one time made 450,000 yearly.[278] American felts excited the admiration of foreign experts, and served

[268] By Moses Hay at Ripka's Mill, *Bagnall Papers*, II, 935–936; Hazard, *Register of Pennsylvania*, II, 15, July 19, 1828; *cf.* Bishop, *History of American Manufactures*, II, 253 (note).

[269] Bishop, *History of American Manufactures*, II, 261; *Bagnall Papers*, II, 936.

[270] *Bagnall Papers*, II, 936; McLane, *Report on Manufactures*, I, 378–379; *cf. American State Papers, Finance*, V, 798.

[271] McLane, *Report on Manufactures*, I, 338 and note, 339.

[272] Chelmsford Manufacturing Co., *Bagnall Papers*, II, 1185–1186.

[273] Barry, *History of Framingham*, 149; Temple, *History of Framingham*, 357.

[274] Massachusetts, *Statistics of Industry*, 1845, 333; Connecticut, *Statistics of Industry*, 1845; U. S. Census, 1860, *Manufactures*, xxxvii.

[275] *E.g.*, Miles, *Lowell*, 98.

[276] United States International Exhibition of 1876, *General Report, Judges Group*, IX, 60–63; *Reports of the Secretary of the Treasury*, VII, 597; *Memoirs of the Wool Industry*, 22–23.

[277] U. S. Census 1860, *Manufactures*, xxxix.

[278] *Hunt's Merchants' Magazine*, XXIV, 373, Mar. 1851; *cf.* XXIV, 122, Jan. 1851; United States International Exhibition of 1876, *General Report, Judges Group*, IX, 53.

all uses from carpeting to coatings.[279] Except worsteds for male attire, every staple cloth of popular consumption had been made successfully within the country.

In 1860 our woolen-mill area extended as far south as San Antonio and as far west as Oregon and California.[280] Despite languid prosperity under the Walker tariff and the severe setback of 1857, which ruined some of our largest companies, the industry grew almost two-thirds within ten years. The mills numbered nearly 1700, employed 60,000 operatives, and ran 640,000 spindles and 16,000 looms.[281] Home manufacturing of linseys and other negro cloths persisted around Baltimore and at Philadelphia, and the weavers of the latter city employed 2000 hand-looms on carpets.[282] Even in the lower valley of the Merrimac, the site of big factories and power machinery, immigrant operatives still made a profession of weaving woolens in their cottages; but in this, as in other industries, the tendency was toward larger plants and geographical centralization. Competition between large and small mills, which was a feature of the contemporary development of woolen manufactures in Europe,[283] was felt sufficiently in America to make some owners of small mills view high protective duties with distrust. The large factories of the Atlantic coast were charged with "crowding their stuffs into the West in exchange for wool, aided by cash capital not possessed by small operators in the West."[284] This was particularly true of fine-wool areas, like Ohio, where the value of woolens manufactured declined almost one-half between 1850 and 1860; but new mills continued to be built in the West for making linseys and flannels from less merchantable varieties of local wool, that in the East would have met the competition of mestizo wools from South America.

Massachusetts remained the leading woolen State, and New England made more of these goods in 1860 than the whole country produced ten years before. Pennsylvania now assumed second rank in this industry, and Philadelphia, with over 200 wool-using manufactories and an annual product valued at $9,000,000, was its greatest single center.[285] That city alone made about as many woolens as New York, which stood third among the States in this manufacture.

[279] *Niles' Register*, XXXVII, 8, Aug. 29, 1829; LX, 32, Mar. 13, 1841; Wallis, *Special Report on New York Industrial Exhibition of 1853*, 17; Committee on the Machinery of the United States, *Report*, 62, in Great Britain, *Parliamentary Papers*, 1854–1855, L; United States International Exhibition of 1876, *General Report, Judges Group*, IX, 47–48.

[280] *DeBow's Review*, IX, 559, Nov. 1850; DeBow, *Industrial Resources*, III, 339; *Hunt's Merchants' Magazine*, XXXIX, 127, July 1858; 269, Aug. 1858; Hittell, *Commerce and Industry of the Pacific Coast*, 439–441.

[281] U. S. Census 1860, *Manufactures*, xxxv, xxxix, xlv, lix; North, *A Century of American Wool Manufacture*, 53–54.

[282] Wallis, *Special Report on New York Industrial Exhibition of 1853*, 18; Freedley, *Philadelphia and Its Manufactures*, 240.

[283] Wachs, *Volkswirtschaftliche Bedeutung der technischen Entwickelung der deutschen Wollindustrie*, 79–84.

[284] *Sen. Doc.* 72, 62d Cong., 1st sess., Part III, 1989, question 14; *cf.* 556, Note 4, preceding.

[285] Freedley, *Philadelphia and Its Manufactures*, 234; U. S. Census 1860, *Manufactures*, xxiv; also 522–527.

Including carpets, hosiery, and mixed cloths, the total value of goods produced in the entire country was $80,000,000, and this industry ranked eighth in national importance.

SILK

Although silk was raised in Georgia, South Carolina, Pennsylvania, and Connecticut during the eighteenth century, its manufacture was the latest textile industry to extend beyond the household. About 1790 bolting-cloths were made at Wilmington and small goods were manufactured at Philadelphia from American materials.[286] Ribbon looms, which probably used some local silk, were set up at Boston and elsewhere.[287] In Connecticut, especially at Mansfield, several hundred pounds of sewing-silk were made annually in families and sold throughout that and neighboring States.[288] But no manufacturing enterprise of sufficient importance to hold a place in industrial history was started at this time.

It took about sixty years to teach Americans that they could not raise silk profitably. Indeed, the highest expectations from this industry were in the late thirties, when they culminated with a craze of speculation in mulberry trees. During this period household manufactures of silk persisted and mills were erected to use domestic materials. In 1810 water-power was applied to reeling and twisting at Mansfield, and later at Gurleyville, Connecticut.[289] Between this date and 1840 mills or manufactories intended to use American silk were started at Northampton, Nantucket, Dedham, Providence, Poughkeepsie, Paterson, Philadelphia, Baltimore, Economy, Nashville, and Mount Pleasant.[290] Some of these undertakings were temporarily successful, and they developed valuable improvements in reeling, twisting, and weaving machinery; but most of them failed, either from lack of raw materials or because they lost more money in silk-raising than they earned by manufacturing. Several States paid bounties on cocoons and raw silk, but the National Government gave no legislative encouragement to this industry. To unwind the cocoons and convert their material into a continuous and even filament for further manufacture

[286] Advertisement, *Maryland Journal*, Mar. 21, 1795; La Rochefoucault, *Travels through North America*, II, 255, 256; Ebelings, *Erdbeschreibung von Amerika*, V, 81; *Hunt's Merchants' Magazine*, XXXVIII, 245–246, Feb. 1858.

[287] *Columbian Centinel*, Nov. 16, 1791; *American Museum*, X, Appendix 2, 34, Nov. 22, 1791; *American State Papers, Finance*, I, 142.

[288] Letter of Constant Southworth, Sept. 1, 1791, in *Hamilton Papers*, Library of Congress; *cf. Massachusetts Centinel*, July 19, 1786; Washington, *Diary*, 25, Oct. 19, 1789; *American Museum*, VII, 166; *Columbian Centinel*, Sept. 1, 1790; *Massachusetts Magazine*, III, 326, May 1791.

[289] Brockett, *Silk Industry in America*, 50.

[290] Brockett, *Silk Industry in America*, 43, 51, 55, 57, 68; *Niles' Register*, XXXVII, 39, Sept. 12, 1829; XXXVIII, 441, Aug. 14, 1830; XLII, 421; Aug. 11, 1832; LI, 272, Dec. 24, 1836; LVIII, 144, May 2, 1840; LVIII, 176, May 16, 1840; Buckingham, *America*, II, 248; Hazard, *Register of Pennsylvania*, III, 34, Jan. 17, 1829; VI, 39, June 30, 1830; VII, 415–416, June 25, 1831; VIII, 2–4, July 2, 1831, Hazard, *United States Register*, V, 46, July 21, 1841; V, 176, Sept. 15, 1841.

requires patient, skillful, and cheap labor. As this could not be procured in America, these preliminary but essential processes never were performed here economically and perfectly on a scale to support mill industries, though in some neighborhoods they employed the otherwise idle hours of family workers, at a time when most people regarded rest and cultural avocations as economic waste.

Manufactures of foreign silk into ribbons and trimmings were earlier successful. They were reported in the census of 1810.[291] Five years later the elder Horstman, founder of a firm still prominent in the silk industry, began manufacturing at Philadelphia. In 1824 he introduced Jacquard looms for narrow goods, and in 1837 began weaving by power on looms designed by his son.[292] Also plain silks were imported from an early date for printing in this country.[293] Our growing consumption of silk goods increased interest in their domestic production, and those manufacturing companies that survived their losses through silk-raising ventures began to use foreign materials. About 1840 China, with which we at that time had a large direct trade, began to send us raw silks in quantities.[294] Though this did not cause the transition to foreign materials that then occurred, it marks conveniently the date when mills ceased to depend on local cocooneries for their supplies.

During the following twenty years our mills made a respectable beginning, especially in the manufacture of sewing-silks.[295] Machine-twist, for use in sewing-machines, was invented in this country just as the machines came into use, and enjoyed the benefit of the large market thus created. This revived and extended the industry at Northampton.[296] A number of small enterprises started in the West and in New England.[297] At South Manchester, Connecticut, the Cheney Brothers gradually built up a model manufacturing town and one of the largest silk plants in America.[298] At Paterson, John Ryle, an English silk-weaver, bought a mill started by the ubiquitous Connecticut manufacturing family of Colts, and between 1840 and 1850 securely established the industry in that city.[299] Attempts were made at Paterson, Seymour, and elsewhere to weave broad fabrics, but without permanent

[291] *American State Papers, Finance*, II, 685, 691.

[292] Brockett, *Silk Industry in America*, 51; Freedley, *Philadelphia and Its Manufactures*, 245–247; Bishop, *History of American Manufactures*, III, 48.

[293] *Niles' Register*, XXII, 250, June 15, 1822; XXIX, 68, Oct. 1, 1825; L, 428, Aug. 27, 1836; McLane, *Report on Manufactures*, I, 224; *House Doc.* 72, 22d Cong., 1st sess.; *Reports of the Secretary of the Treasury*, VII, 792.

[294] Brockett, *Silk Industry in America*, 89.

[295] Wyckoff, *Silk Goods of America*, 14; United States International Exhibition of 1876, *General Report, Judges Group*, IX, 96–97.

[296] Brockett, *Silk Industry in America*, 58; Wyckoff, *Silk Goods of America*, 16.

[297] *Hunt's Merchants' Magazine*, XIV, 155, Feb. 1846; *Farmer and Mechanic*, II, 347, July 20, 1848.

[298] Brockett, *Silk Industry in America*, 60–66; United States International Exhibition of 1876, *General Report, Judges Group*, IX, 100–101.

[299] Brockett, *Silk Industry in America*, 68; United States International Exhibition of 1876, *General Report, Judges Group*, IX, 102–103; *Farmer and Mechanic*, II, 286, June 15, 1848.

success.[300] The second half of the century opened with our silk manufacture still "comparatively in its infancy," and the production of domestic raw silk rapidly declining. During the next ten years our mills trebled their output of sewing-silk, and it is probable that the increase in trimmings and narrow goods was equally great. In 1860 only one firm made wide silks, but its business had doubled since 1855.[301] Philadelphia and New York City manufactured most of the trimmings and other small wares reported. Connecticut led in the production of spool silks, followed by New Jersey. Massachusetts held a respectable position in both lines of manufacture. The gross value of all these manufactures was about $6,500,000, of which over one-half was represented by sewing-silk.

[300] Montgomery, *Cotton Manufacture*, 102; Wallis, *Special Report on New York Industrial Exhibition of 1853*, 20–21.

[301] U. S. Census 1860, *Manufactures*, xcv, ciii; A. T. Lilly, "The Silk Industry of the United States from 1766 to 1874," in National Association of Wool Manufacturers, *Bulletin*, v, 263–269, Jan. 1875; Heusser, *History of Silk Dyeing in America*, 78–174.

CHAPTER XXI

REVIEW OF THE PIONEER PERIOD

Histories of individual industries might be multiplied indefinitely, but they would reveal few general facts not already illustrated by other and apter applications. At the time when our country was founding its economic system, manufacturing everywhere broke away from ancient technical precedents; processes of production were revolutionized, and world forces were set at work that superseded the limited and local conditions of a single nation. To these broader influences, rather than to our great natural advantages or to the genius of our people, must be attributed much of our industrial progress. But physical factors in our own history assisted this result, by the materials they afforded, by the demands for finished products they created, and by their influence upon the volume and distribution of population. Nor need our modesty refuse some credit to the enterprise and intelligence of our countrymen, which enabled them to rationalize methods of production as rapidly as any nation.

Manufacturing is the phase of production that has modified most our national character and the constitution of society. The prolific output of machinery has made us prodigal in respect to things of which formerly we were thrifty, and has substituted a thirst for change in place of an earlier love for fixed order and familiar ways. The material environment, like the intellectual environment, of our forefathers was permanent. They lived in the same houses, used the same furniture, employed the same implements, wore the same clothing, and viewed the same scenes from youth to old age. Their minds reflected the conservative habit of their surroundings. A certain immobility of ideas and customs responded to the fixed features of their habitat. Two discordant attractions drew some away from this routine, the sea and the frontier. But here again, even with an element of change and adventure, our ancestors experienced repetitional ways of living; and the solitude of the settler and the sailor were vastly different from the multicolored experience of modern life. In its fuller sense variety was the privilege of the few.

That this condition has changed, whether for better or worse, is due mainly to the growth of manufactures, whose very end is to diversify our material surroundings. Here, more than in other fields of production, mind suddenly acquired a new control of matter that manifolded

its creative potency. So bountiful was the resulting output from natural forces and machinery that things formerly rare became commonplace. This forced an advance towards material democracy; for modern industry, despite ill-balanced distribution, places means for larger living within reach of the many that formerly existed only for the few. Even before 1860 no small share of the nation's industrial effort was expended in popularizing luxury. Each year the apparatus of everyday life became more complex and its replacements more frequent. In this flux of environmental elements superficial distinctions of rank and wealth were lost. The laborer no longer wore leather breeches and ate with a pewter spoon from a wooden trencher, because the manufacturer, who existed by the worker's purse, furnished him with cheap garments and table wares that rivaled in appearance those of his employer. Where old habits of consumption persisted, they were broken up by westward migration; for when new homes were built new things were bought, and factory fashions dictated the furnishing of these establishments. When the revolution in manufactures thus overthrew the conventional bounds of class consumption, it threatened that ancient code of economic ethics in which frugality was the cardinal virtue. In the midst of no little controversy the common people changed from the asceticism of homespun industrial morality to the hedonism encouraged by highly productive and commercial aggressive factory manufactures.

Not only as consumers but also as producers were we affected by new methods of production. When the type of industrial organization changed, other social forms changed with it. Eighteenth-century Americans lived in what seems to-day a contradictory society—in a democracy with recognized class distinctions, in coöperative townships tingling with economic individualism, and not infrequently in communities of independent workers subject to the almost feudal control of their employers. With the advent of organized manufactures class privileges and insignia disappeared, partly because they were out of place in a mobile manufacturing population; family and neighborhood coöperation lost much of their significance and were replaced by the less spontaneous but more efficient coöperation of industrial groups; and employers ceased to regulate the private affairs of their working-people, after these freed themselves from a domestic status. A new industrial discipline arose, less rigorous but more exacting than the old. Men worked fewer hours than formerly, with less physical exertion, and in more comfortable surroundings; but—paced by machinery—they also worked more regularly, systematically, and intently.

Possibly we now devote no more labor relatively to manufacturing than when we were chiefly a farming and trading nation. No census has ever been made of the working-hours of all the people, distributed in the various branches of production. Without such counts we can

not estimate what proportion of the household and homestead labor of our ancestors was given to manufactures; but it may well have exceeded, for each inhabitant, the proportion at the present time. We know, however, that the fraction of the population exclusively engaged in industrial pursuits has constantly increased.

This integration of occupations has caused workers to group in large communities, so that manufacturing has added to the number and size of our cities. Specialization of trades has increased the interdependence of industries and of those who conduct them, thus socializing production. Men are trained to work together and are taught by material examples to adjust their individual services in subordination to a larger common purpose. It is not fanciful to suppose that this discipline finds expression also in social and political action and increases the nation's capacity for intelligent collective effort.

Manufacturing, like commerce, is cosmopolitan, and it has mitigated a parochialism that grew out of our geographical isolation and rural living. Its materials are gathered from all parts of the earth; its products are distributed to distant regions; and its successive processes sometimes are performed in different zones and hemispheres. About 1840 New England manufacturers sent agents with reels to China, who taught the people of that country to prepare silk for American mills; and operations begun on the banks of the Yang-tse-kiang were completed on the banks of the Connecticut. Though home industries were advocated as a means to national independence, they increased our intimacy and our intercourse with other lands, and made our economic organism more sensitive than before to foreign influences.[1]

Factories encouraged the immigration of skilled workers, who otherwise might not have been attracted from Europe. These brought with them, together with the democratic traditions of manufacturing towns, a prejudice in favor of strong government and national protection to industry. Knowing little of the particularist traditions of the early Republic and without sectional sentiment, they were consistent and determined supporters of Federal authority and they helped make the political theories ratified by the issue of the Civil War.

The industrial statistics of the antebellum period are so inaccurate that the best figures they afford are little more than commonly accepted symbols for unknown quantities. However, they indicate with sufficient precision that in 1850 and 1860 the proportion of the population engaged in manufacturing was about 1 to 8 in New England, 1 to 15 in the Middle States, 1 to 48 in the West, and 1 to 82 in the South. By 1900 these figures had become 1 to 7 in New England, 1 to 10 in the Middle States, 1 to 20 in the Ohio and upper Mississippi valleys (formerly called the West), and 1 to 35 in the South. While in 1860 relatively 10 times as many were employed in manufacturing in New England as in the South, forty years later but 5 times as many were

[1] *E.g.*, Grover and Baker Sewing Machine Company, *Correspondence*, 1860.

so employed. Therefore, in spite of the geographical concentration of certain manufactures, the sectionalism of industry has decreased. We have no means of ascertaining when this change began, though it probably is related to the transition from household to factory production. The growth of organized manufactures has strengthened the economic solidarity of the nation, and local differentiations of industry represent only the external isolation of functionally dependent parts in a larger productive mechanism. Agricultural and manufacturing States do not regard each other with their former distrust, because they are no longer devoted so exclusively to these respective pursuits, and because they now are conscious of their larger unity of interests.

In the eighteenth century many Americans entertained a strong prejudice against manufacturing. People so engaged were thought to degenerate both physically and morally. In popular opinion their dependence on the will of employers made them servile, their irregular employment made them irregular in habits, and their material surroundings deteriorated their health, stature, and bodily vigor. This was not an indictment of the factory system, because the domestic organization of manufactures still prevailed in Great Britain. But when factories were established in America, the old arguments against manufacturing in general were directed against them. An appearance of justice was given such charges, because industrial evils formerly dispersed were made conspicuous by centralization, even though they did not necessarily increase. Americans still retain a theoretical preference for farm life that survives its application as a rule of action. A century ago that preference was grounded in habit, and created the conviction that freeholder and freeman were synonymous, and that to divert our people to manufacturing was to undermine our civil institutions. Factory employees were supposed to lack the economic independence, the moral fiber, and the physical aggressiveness required to defend political liberty. Some public men, like Jefferson, who became advocates of domestic industry, probably feared these results from highly organized and differentiated manufactures, and that fear may explain occasional contradictions in their attitude. Only experience could relieve this distrust; and happily it has done so, though the social problems arising from modern industry have assumed phases unanticipated by our ancestors and far more serious than they contemplated. Indeed, manufactures have favored free institutions rather than the reverse; and class distinctions and labor disabilities lingered longest in the strongholds of agriculture. Workers individually may exercise less self-direction in large modern plants than in small workshops, but collectively they have more control over conditions of employment. Though corporations have no souls, they are sensitive to a public opinion that would not tolerate the arbitrary labor discipline of early masters and their thoroughgoing exploitation of those who served them.

The cultural influence of manufactures, especially through printing and reproductive art, has given unity to the people. There is a culture of taste as well as of thought that qualifies men for social coöperation by giving them common standards of judgment; but in this direction our evolution has been rather tardy. It found early expression in uncouth patterns and crude colors of cloths and carpets, in over-adorned and grotesquely designed furniture, in the primitive melodic powers of the cabinet organ, and in the inharmonious tints of the cheap chromo. Indeed, the art standards of the whole world were vitiated for a time by the exuberant products of mechanism, and America merely yielded to a vogue in accepting them. In 1860 popular taste was not yet chastened by a vision of better things. But already printing and publishing ranked among the larger industries. The reading public embraced most of the white people in the country, and our annual expenditures for domestic books and publications exceeded $30,000,000.

While the nation applied relatively less productive energy to manufacturing in 1860 than did some nations of Europe, the net return from this activity exceeded $800,000,000. Portions of the United States were as highly industrialized as Great Britain itself, though these areas were dwarfed in contrast with the continent of farms and forests of which they formed a part. Most of our manufactures were used at home; they formed but one-tenth of our exports, and we bought far more commodities of this kind from foreigners than we sold to them. Our emphasis of the utilitarian at the expense of the art aspects of industry betokened the immaturity of a new country. The technology of our manufactures was practical rather than scientific, and few men were formally trained to apply generalized knowledge to productive processes. However, when the Civil War broke out, the North had a mechanical equipment easily extended to meet the nation's needs. The territorial cleavage of that crisis left the manufacturing districts of the Union in a single section, where they acquired an influence that enabled them thereafter to dominate public policies. Despite an experimental interest in national industry during the twenties, and a brief revival of protectionist control in 1842, our Government retained the sympathies and programs of an agricultural commonwealth until 1860; after that it was guided by the interests of an industrial State. If public policies express facts of national economy, we were just beginning at that date to be a manufacturing nation; and the history we now close of the preceding period is but a study of origins—a prologue to the narrative of the greater things that followed.

INDEX

Abbott Rolling Mills (Baltimore), 514.
Acrelius, Israel, 80, 110.
Adams, John, 134, 218.
Adulteration, see *Inspection Laws*, 65.
Africa, 99.
Agricultural Implements, colonial, 112; manufacture of, 474–479.
Alabama, hot-blast bloomeries, 413; iron, 498; plantation spinning machinery, 440; resolution against monopoly, 281; ship-building bounties, 470.
Alabama River, 558.
Albany (N.Y.), brewing, 481; capital, 145; firearms, 221; homespun not used, 199; homespun jackets, 116; Indian trade, 100; Jersey shoe warehouse, 116; lumber, 74, 467 and note 7; manufacturing center, 89; Ohio iron, 348; Poughkeepsie woolens, 562; stovemaking, 377, 503, 504; tax on Indian goods, 58; tobacco factory, 487; trade with Calcutta, 335; vehicles, 475.
Alexandria (Va.), 508.
Allaire Iron Works (New York City), 507.
Allen, Zachariah, 463.
Almy and Brown (cotton manufacturers), capital, 367; cotton-manufacturing, 357, 448–449, 625; credits, 365; shipments overland, 336, 350, 356.
Alum, 5, 112.
American Linen Company (Fall River), 532.
American Print Works (Fall River), 373, 381.
Ames Shovel Works (Mass.), 417.
Amesbury Woolen Manufacturing Company (Mass.), 570.
Amherst (Mass.), 475, 476.
Amiens, Peace of, 284.
Amory, Thomas, 145.
Amory Iron Works (Richmond), 514.
Amoskeag Company (Manchester, N.H.), 458.
Amsterdam, 154.
Ancram Iron Works (N.Y.), 91.
Andover (Mass.), flannels, 564; powder mill, 222; satinets, 564.
Andover Iron Works, (N.J.), 221.
Andros, Sir Edmund (Governor), 52, 69, 84, 130–131.
Annapolis (Md.), 42, 148.
Annawan Cotton Company (R.I.), 467.
Ansonia (Conn.), 526.
Antwerp, 5.
Appleton, Nathan, 308–309, 390, 462, 548.
Appleton Company (Lowell), 374, 407, 546.
Apprentices and *Apprenticeship*, coopers, 162; England and colonies, 6, 67; trade instruction, 50, 67–68, 155.
Arctic (S. S.), 515.
Arkwright Machinery, 8, 160, 192, 261, 425–426, 450, 534, 535, 537, 538.
Arnold, Benedict, 114, 116.
Arsenic, 344.
Artisans, Boston, 195; combine different occupations, 161; enumerated, 163–164; forbidden to emigrate from Great Britain, 260; New York, 198; patriots, 225; Philadelphia, 162, 164, 195; Pittsburgh, 273; political activity, 162; Virginia, 10–11, 196.
Ashburnham (Mass.), 473.
Association of Iron and Steel Manufacturers, 501.
Atlanta (Ga.), 514.
Attleboro (Mass.), 528.
Auburn (N. Y.), 523.
Auction System, 241–242, 358, 359.
Augusta (Ga.), 469, 552, 557, 558.
Augusta County (Va.), 223.
Austria, 362.
Axes, 209, 475, 513, 522.
Azores, 93.

Bagging (see *Hemp*), 343, 346, 532.
Bahama Islands, 83.
Bakeries, connected with colonial mills, 179; regulated, 65, 68, 166.
Balance of Trade, 121–122, 258.
Baldwin Locomotive Works (Philadelphia), 508, 509.
Balfour (London merchant), 211.
Ballston Spa (N. Y.), 538.
Baltic (S. S.), 515.
Baltic Company (England), 4.
Baltic Cotton Mill (R. I.), 453, note 3.
Baltic Countries, 9.
Baltimore (Md.), canning, 485; cloth printing, 548; copper, 525; corporations, 459; cotton duct, 549; cotton goods exported, 362; cotton manufactures, 104, 107, 192, 453, 534, 537, 538; flax manufactures, 191; flaxseed exports, 82; freights, overland, 90, 337; furniture exports, 472; furniture manufactures, 473; gas, 494; iron works, 506, 514; locomotives, 508, 509; looms, hand, 550, 574; looms, power, 541; lumber, 468; memorial to Congress for protective duties, 390; operative class, 540; sales of domestic manufactures, 359; ship-building, 470; silk, 575; sugar-refining, 304; Susquehanna Valley trade, 338; tobacco, 487; vehicles, 475; wages, hatters, 394; weaving rates, 388; woolen mills, 562.
Baltimore, Lord, 18, 105.
Baltimore and Ohio Railroad, 511.

Baltimore Manufacturing Company (Baltimore), 192.
Bancroft and Sons (woolens), 570.
Bangor (Me.), 467.
Banister, John, 131.
Banks, 132, 151, 364, 366, 378, 484.
Barbados, 83, 84, 98.
Barilla, 333.
Barr, Robert and Alexander, 43.
Barrows, Thomas (woolen manufacturer), 377.
Barter, 124–127, 365.
Batchelder, Samuel (inventor), 429.
Bath (N. Y.), 338.
Batsto Furnace (N. J.), 176.
Bay State Mills (Lawrence), failure, 382, 463; shawls, 573; size, 453.
Beaumont, James (cotton spinner), 374.
Beaver Falls (Pa.), 518.
Bedford County (Pa.), 38.
Bedford County (Va.), 389.
Beer (see *Brewing*), adulteration, 65; duties, 59; intercolonial trade, 114; West Indian imports, 99.
Belcher, Jonathan (Governor), 203–204.
Belfast (Me.), 467.
Bellomont, Richard Earl of (Governor), 105.
Bemis, Seth (duck manufacturer), 336.
Benton, Senator Thomas, 306.
Berkeley, William (Governor), 18, 69, 82, note 1.
Berks County (Pa.), 503.
Berkshire County (Mass.), 394, 497, 564.
Berlin (Conn.), 523, 524, 527.
Bermuda Islands, 83, 98.
Bernard, Sir Francis (Governor), 111, 207–208, 210.
Bessemer, Sir Henry (inventor), 261.
Bethlehem (Conn.), 534.
Bethlehem (Pa.), 186, 414, footnote.
Beverly Cotton Manufactory (Mass.), incorporated, 266; jennies, 425, 448, 534, 535; labor and wages, 389; land grant, 40; machinery, 191, 423; profits, 373, 448.
Beverley, Robert, 197.
Bigelow, Erastus B. (inventor), 429, 462.
Billerica (Mass.), 564.
Birmingham (England), 5, 12, 154, 394.
Blacksmiths, 11.
Blackstone Manufacturing Company (Mass.), 373.
Blackstone Valley (Mass.), 404, 536.
Bleaching, 431, 545, 549.
Bloomeries, see *Iron*.
Board, 136.
Board of Trade, disallowed colonial laws, 26; established, 13–14, 22; false value of exports and imports, 120.
Bohemia, 400.
Bolton Cotton Mill (Ga.), 539.
Booth, George (woolen manufacturer), 562, 563.
Boots and Shoes, Boston sales, 359; colonial manufacture, 110–111, 231; craft societies, 66, 162; crisis of 1837, p. 381; duties, 271, 301; exports to West Indies, 99; labor specialization, 444; Lexington, 341; localization, 444; Lynn, 186, 187, 345, 444; machinery, 444–445; Massachusetts, in 1763, pp. 207–208; organization, 441, 443–444; New England sales at Philadelphia, 345; Pittsburgh, 345; price, 142; trade, intercolonial, 99, 116, 212; Virginia, 32, 195, 209; wages, 394–395.
Borden Family (cotton manufactures), 458.
Borden, Holder (cotton printer), 375.
Borden, William (colonial duck manufacturer), 39, 43.
Boston (Mass.), artisans, 162, 163, 195; board, 136; calico printing, 547; capital, 145, 482, 545; coal, 332; copper, 203, 525; corporations, 460; cotton duct, 549; cotton goods exported, 362; cutlery, 523; duck factory, 373, 530; factory promotion, 451; fires, 130, 187, note 4; firewood from Maine, 75; foundry, 502; freights, 90; furniture, 472, 474; gas, 494; glass works, 332; grant to mill, 41; hemp imports, 25, note 1, 112; homespun jackets exported, 116; homespuns, 200; imports, 112; iron-rolling, 332, 514; locomotives, 509; looms, stocking, 189; lumber, 467; Manufactory House, 43, 132, 189, 208, 216; markets, cloth and shoe, 358, 359; monopolies, 51; non-importation, 216; packing, 482, 484, note 2; Pennsylvania stoves, 115; petitions upon tariff, 57, 62; Philadelphia paper, 116; population, 104; prices, flour, 337; prices, iron, 138; prices, rise, 197; prices, yarn, 142; profits, manufacturing, 376; profits, 148, 373; rents, 150; sewing-machines, 521; ship-building, 208, 470; ship iron-work, 469; shipping trade, 559; ship timber, 469; silk, 575; Society for Encouraging Industry, 183, 189, 206; spinning craze, 200, 206; spinning loan, 42; spinning-schools, 67, 188; starch, 482; steam turbine, 410; steel, 517; stoves, 503; sugar-refining, 491; tide mill, 174; wages, 208, 394; weaver's estate, 163; woolen manufactures, 190, 197; wool sales, 359; workshops, 187; worsteds, 142, 163, 197.
Boston and Canton Manufacturing Company (Canton, Mass.), 566, 567, 570.
Boston Company (watchmaking, Waltham, Mass.), 454.
Boston Manufacturing Company (Waltham, Mass.), auctions, 358; bleachery, 545; capital, 546; first true factory, 450; goods on hand, 383; merchant managers, 459; Merrimac stock, 460; mule spinning, 427; petition for banking powers, 366; prejudice against domestic goods, 358; profits, 374, 376; prosperity during crisis, 545; wages, 395.
Bounties (see also *Laws, Bounty*), defined, 33; duck, 35–36, 530; flax, 34; hemp, 33–34; indigo, 36; Irish linens, 110; potash, 36; salt, 36; saltpeter, 36; shipbuilding, 36, 470; silk, 25, 34, 36, 575; spirits, 36–37; stoneware, 36; tar, 36; textiles, 34–36; woolcards, 36.
Bourbon Furnace (Ky.), 341.
Boyden, Uriah (inventor), 407.
Bradford (Mass.), 222.
Brady's Bend Iron Company (Pa.), 386, 446.
Braintree (Mass.), 41, 138, appendix V.

Brandywine Creek (Del.), 64, 185.
Brass, English manufactures, 5; founding, 502; general, 525–527; sleeve buttons, 524; spinning, 421, 526, 527.
Brazil, 361, 552.
Bremen, 400.
Brewing, Albany, 481; colonial, 166–167; discouraged by wine imports, 99; duties on malt and hops, 58–59; inspection, 65; lager beer, 481; Lexington, 341; Philadelphia, 231, 481; Pittsburgh, 340; plants and processes, 166–167; Virginia, 195; western, 481.
Brewster (spinning machine), 425, 428.
Brick, 11; exports, 98; inspection, 65; intercolonial trade, 115; process of manufacture, 166.
Bridgeport (Conn.), 521.
Bridgewater (Mass.), 441, 506, 514.
Briggs, Isaac (inventor), 49.
Brimstone, see *Sulphur*.
Bristles, and packing, 483–484; imported, 327; price, 340.
Bristol (England), 92, 95.
Bristol County (Mass.), 510, 516.
Britannia Ware, 526, note 1, 527.
Broadcloth, see *Woolen Manufactures*.
Brockport (N. Y.), 478.
Brookfield (Mass.), 216.
Brooklyn (N. Y.), cotton mill, 534; gas, 494; wages, 391.
Brougham, Henry, 240.
Brown, John (linen weaver), 189.
Brown, Moses (cotton manufacturer), 562; charges unfair competition, 239–240; child labor, 398; linen, 432; mule spinning, 427; price agreement, 458; quality American cotton, 319.
Bucks County (Pa.), 178.
Buffalo (N. Y.), blankets, 568; car-wheels, 505; coal, 353; iron works, 353, 498, 514; iron steamer, 469; lumber, 467; manufactures in 1854, pp. 353–354; Rhode Island cotton goods, 343; ship-building, 470; stoves, 503.
Bull, William (Lieutenant-Governor), 133, 210.
Bullion, exports and imports, 125, 286, appendix I.
Burke, Edmund, 119.
Burlington (N. J.), 108, 117.
Burnaby, Andrew, 206, 624.
Burnet, William (Governor), 56.
Burning Fluid, 493.
Busching, Paul, 28.
Button Manufactures, 524–526.
Byfield (Mass.), 423, 561.
Byrd, William, 198.

Cadiz, 94.
Calcutta, 335, 362, 550.
Calhoun, John C., 368, 542, 555.
Calico, see *Cotton Manufactures*, *Print Cloths*.
California, gold discoveries, 246, 249, 285, 396; market for manufactures, 361, 485; sawmills, 468; vehicles, 476; woolen mills, 574.
Cambria Iron Works (Johnstown, Pa.), 385, 515.
Cambridge (Mass.), 69.
Camphene, 493.
Canada, favored by Great Britain in West Indian trade, 257; imports American manufactures, 114, 294, 361; Indian traders use American goods, 15, 100; manufactures encouraged, 15–16; reciprocity treaty, 269, 295; wages, 16; wool, 295, 324.
Canals, distances and time of carriage, 350–351; Erie, 347; influence on freight rates, 347–349; New York, 347–348; Ohio, 350; Pennsylvania, 349; power, 185, 404–405, 557; Sault Ste. Marie, 348; Western Inland Company, 338.
Canary Islands, 93.
Candles, colonial, 86; duties, 271, 301; exports, 97, 301; Louisville, 492, note 2; patent, 50; relation to cotton spinning, 357; Rhode Island, 208; St. Louis, 344; statistics, 492; trust, 184; West Indian market, 99.
Cannelton (Ind.), 558.
Canning, 485.
Cannonsburg (Pa.), 537.
Canterbury (Conn.), 429.
Canton (China), 252.
Canton (Mass.), cotton mills, 367; negro cloth, 566, 568; satinets, 564; woolen mills, 357.
Canton Iron Works (Baltimore), 506.
Canvas, see *Duck*.
Cape Breton Expedition, 134.
Cape Cod (Mass.), 470.
Cape Fear River (N. C.), 95, 177.
Capital, accumulated by mechanics, 367; advanced by War Department, 369; Boston, 145, 482, 545; Bremen, 400; brick and tile, 166; British, 24, 146–147, 220–221, 243; capitalization of manufacturing companies, 266–267; Charleston, 557; Cincinnati, 465, note, 482; colonial, 124, 144, 145–146; commercial, 367; cotton mill, 374, 538; factor system and southern investment, 554; glass works, 146, 147; government loans advocated, 369; iron works, 146–147, 173–174, 383–384, 446; losses in manufacturing, 373; Louisville, 558; manufacturing, 151, 192, 367–369, 465, note; Newburyport, 561; New York City, 465, note; operating, 371; organization, 280–281, 461; Philadelphia, 146, 368; Providence, 458, 541; railway, 382; ratio to output, 371, 372; Salem, 368; scarcity, 152, 369–370; shipping, 237, 368; South Carolina, 146; sources of early manufacturing, 192; Virginia, 146, 152; woolen manufacturing, 369–370, 373, 377, 562.
Car-wheels, see *Iron*.
Cards, Hand, bounty, 36; duties, 271; imported, 112, 222, 260, note 2; machinery, 222; Philadelphia, 231; Virginia, 84.
Cards, Power, Beverly, 191; Byfield, 561; Elkton, 561; Hartford, 561; introduction, 423; North Andover, 446; Philadelphia, 43, 90; self-cleaning, 423.
Carpets, manufactures, 568–569, 570; power looms, 429–430; wool used, 466.
Carroll, Charles, 191.
Carthage (N. Y.), 386.
Cartwright, Rev. Edmund (inventor), 428.
Case, Jerome I., 478.
Catawba Valley (Carolinas), 107.
Cayuga County (N. Y.), 478.
Cecil County (Md.), 513.
Chairs (see *Furniture*), 472, 473.

Chalmers, George, 624; American commerce, 255; divisions of colonial history, 2; paper currency, 128; wars and manufactures, 133.
Chambersburg (Pa.), 523.
Chapman, H. (distiller and soapmaker), 44.
Charles I., 5, 12, 13, 15.
Charles II., 12, 13.
Charleston (S. C.), capital in cotton manufactures, 557; cloth manufactures, 191; convention favors manufactures, 555; cotton exports, 84; Homespun Company, 538; mechanics, 61, 162; price of brick, 115; settlement, 2; steam cotton factory, 557; steam-engines prohibited, 556; sugar refinery, 210.
Charlestown (Mass.), 423, 561.
Charlottesville (Va.), 223.
Chattahoochee River (Ala.), 558.
Chauncey, Elihu, 50.
Chelmsford (Mass.), 41, 573.
Cheney Brothers (silk manufacturers), 576.
Chesapeake Bay (Md.), 469.
Chester County (Pa.), 510.
Chesterfield District (Va.), 331.
Chicago (Ill.), car-wheels, 505; harvesters, 478; lead manufactures, 330; lumber, 467; packing, 483, 484.
Chicopee (Mass.), 523, 551.
Child, Sir Josiah, 4.
Child Labor, 264, 397, and note 5, 398.
Chile, 330, 362.
Chillecothe (Ohio), 542.
China, imports clocks, 363; imports American cottons, 362, 550, 557; silk, 252, 327, 576, 580.
Christiana Creek (Del.), 64.
Cider, 114, 481.
Cigars, see *Tobacco*.
Cincinnati (Ohio), brush factories, 466; burning fluid, 493; candles, 492; capital, 465, note; car-wheels, 505; coal, 332, 346; cotton mills, 538, 542; cotton spindles, 558; engine works, 409, 507, 509; furniture, 474; gas, 494; hardware, 525; harvesters, 478; industries, 346; jenny manufacture, 425; lard oil, 493; packing, 482, 483, 484; population, 465; rolling mills, 514; ship-building, 470; soap, 484; stave machinery, 472; steamboat building, 471; steel, 415, 517; stoves, 503; sugar refining, 491; textile machinery, 439; textile mills, 346; whisky market, 480; woolen mills, 346, 563.
Clarksville (Tenn.), 499.
Clay, 203.
Clay, Henry, 279, 281, 380.
Cleveland (Ohio), coal, 353; commerce, 348; ship-building, 470.
Clinton, George (Governor), 205.
Clintonville (Ga.), 478.
Clintonville (N. Y.), 386, 512.
Clocks, confiscated, 363; cost, 387; crisis, 381; exported, 363; interchangeable parts, 420–421; Philadelphia, 231; Poughkeepsie Clock Company, 268.
Cloth, see fabrics by name under *Cotton Manufactures*, *Flax Manufactures*, and *Woolen Manufactures*.
Clothing, change in male attire, 563–564; colonial imports, 111; household manufacture, 441 and notes 7 and 8; indicated colonial rank, 108; intercolonial trade, 116; price, 142; ready-made in colonies, 116–117, 142.
Coal (Coke), affects geography of iron manufactures, 328–329, 498; American mines, 331; Buffalo, 353; Cincinnati, 346; Cleveland, 353; colonial use, 90; imports, 90, 331; industrial use, 86, 315, 331–332, 520; iron smelting, 412–413, 498, 501; output, 331, 332; Philadelphia, 332.
Cocheco Cotton Manufacturing Company (Dover), 546, 548.
Cohoes (N. Y.), 430, 559.
Coin, see *Silver*.
Cold Springs (N. Y.), 507.
Colden, Cadwallader (Lieutenant-Governor), 79, 210.
Collinsville (Conn.), 522.
Colonial Policy, British, 14–15; Dutch, 15; French, 15–16.
Colonies, England's reason for founding, 9–12.
Colt, Elisha, 350.
Colt Family, 576.
Columbia (S. C.), 552.
Columbus (Ga.), 557, 558.
Columbus (Ohio), 347.
Combing Machinery, 424, 572–573.
Commerce, see *Trade*.
Commissions, colonial mercantile, 148–149; manufacturers' agents', 356–357, 358.
Companies (see *Craft Societies*), British trading, 4; city, 6; commercial joint stock, 182, 456; organization of colonial, 172–173, 182–183; origin, 3; shares, 456–457.
Competition, alleged unfair, by British manufacturers, 239–240; between small and large factories, 556, 574; British advantages, 243–245; British in West Indies, 131; changing field, 249; East Indian, 243; English woolens, 250, 293; foreign as measured by volume of imports, 245–254; Great Britain, 143, 253; restriction, 184–185, 457; tariff influences, 311–312.
Concord (Mass.), 570.
Concord (N. H.), 475, 476.
Confederation, Manufactures of, 227–232.
Congress, Continental, 32, 215, 219, 220.
Connecticut, anchors, 506; andirons, 526; Arkwright mills, 535, 536, 538; axes, 522; axles, 517; bolts, 517; brass, 526; buttons, 524; carpets, 466, 568; cigar-making, 488; clocks, 363; companies, 456; corporations, 266; cotton manufactures, 32, 536, 544; cutlery, 523; duck, 36, 44, 51; export duties, 56; exports, flax manufactures, 116; exports, flaxseed, 82; firearms, 517; glass, 51; hardware, 524; import duties, 59, 60; imports, cotton, 32, 77; imports, iron ore, 496; inspection, 66; iron works, 220, 377; jewelry, 527; knitting, power, 559; land grants, 40; laws, 31; laws, bounty, 34, 35, 36; laws, export, 54; laws, factory, 264; laws, tax, 45, 46; linen, 208, 373, 440, 456; liquor for iron workers, 69; looms, power, 429, 565; lotteries, 44; lumber, 468; manufactures, 204, 208; monopo-

lies, 47, 50, 51; nails, 515; patents, 50; peddlers, 524; population, 3; potash, 51, 166, 208; prices, cloth, 225; profits, 373, 377; ratio of capital to output, 371; sewing machines, 522; silk manufactures, 36, 575, 576, 577; silk-raising, 34, 36, 326; slitting mill, 45–46, 51; spindle increase, 544; steam mill, 432; steel, 50, 208, 221, 516; stove-plates, 503; tax on merchants' sales, 69; tinware, 523; vehicles, 475, 476; weaving, household, 539; wire, 518; wire-makers petition, 296–297; woolen manufactures, 44, 46, 198, 225, 429, 432, 562–563, 567, 568; workshops, 44, 442; worsteds, 573.

Connecticut Valley, cigar-making, 488; flax center, 82; forests, 73; imports, wool, 78.

Consumption, articles in colonies, 108–112; character of foreign goods, 246–252; iron, 329, 496; per capita imports, 245–246; source of foreign goods, 251–252; sugar, 491, 492; wool, 324–325, 569.

Cook, Dr. William, 49.

Cook County (Ill.), 479.

Cooper, Peter, 508.

Coopers and Coopering, apprentices, 162; craft society, 66, 162; machinery, 346, 472; protected in New York, 60.

Copper, boilers, 408, note 4, 505; colonial, 76, 203, 204; duties, 288, 295–296; exports, 296; imports, 330; Lake Superior, 328; manufactures, 525; Michigan, 328, 330, 348–349.

Copperas, 112, 315.

Coram, Thomas, 204.

Cordage (see *Hemp*), colonial, 231, 530; depression, 345–346; duties, 271; intercolonial trade, 116; Kentucky manufactures, 342, 345; negro labor, 399.

Corliss, George (inventor), 509.

Corliss Engine Works (Providence), 506.

Corn Laws (England), 258–259.

Cornbury, Lord (Governor), 198, 212.

Corporations, abuses, 460–461; advantages, 267–268; British and American theory, 265; capitalization, 266–267; charters refused, 268; colonial antecedents, 182–184; community of interest, 457; criticized in New England, 461–463; laws, 265–267; localization, 455–456; Lowell, 545, 546; mill and furnace, 445–446; opposition to, 280–281; origins, 456–457; size of shares, 457; southern, 459, 554–555.

Cosby, William (Governor), 87.

Costs (see *Freights*), cigar-making, 488; clocks, 387; cloth-making, colonial, 149; effect on minimum valuation duties, 278; furniture-making, 473; importing, colonial, 148–150; iron-making, 385–386; labor in the United States and Great Britain, 244, 389–390; manufacturing in America and England, 157–158, 244, 292–293; marketing, 358; textile labor, 387–389, 433.

Cotton, British tariff, 259, 554; consumption, 83, 538, 560; Delaware, 84; during Revolution, 85; East Indian, 320, 362; exports, 84; freights, 319, 337; gins, 84 and note 5, 85, note 1, 159, 342, 422, 478; imports, 32, 77, 83, 212, 319, 320; Indiana, 542; New Jersey, 84; Ohio, 84, note 1; price, 84, 142, 337, 386–387; price determined by Liverpool, 550; price fluctuation, 550, 553; profits, 368; quality, 319; Sea Island and early machinery, 433; shipped via river and canals, 320, 348; South Carolina, 84; tariffs, 60, 83, 259, 288; Upland and early machinery, 319; Virginia, 83, 84, and note 5, 209; West Indian, 77, 83, 319.

Cotton Manufactures, Arkwright mills, 535–536; Baltimore, 104, 107, 192, 453, 534, 537, 538; bed-ticking, 534; bleached and fine goods, 549; candle wicks, 357, 387; capital, 538; cards, 423; Census of 1810, p. 253; centralization, 543–544; Cincinnati, 346; climate and fine spinning, 559; colonial, 212; corduroys, 534; crises, 309, 379, 380, 383, 539, 540, 541, 550–551, 553; displace linens, 441; domestics, 540; drillings, 546; duck, 530–531, 549; during War of 1812, pp. 345, 538–539; early English, 5; exports, 362, 550; factory system, 449–450; Georgia, 44, 459; imitations of foreign goods, 550; imports, 246, 247–250, 251; Indian cottons, 110, 243, 271; jeans, 534; jenny mills, 534; knit goods, 559; Lexington, 346; Lowell and New Hampshire corporations, 545, 546; machine improvements and prices, 386–387; machinery, 422, 424–425, 426–432, 540–541; machinery, ratio of looms to spindles, 543; Massachusetts, 196, note 1, 201; mills, 192; mills in 1809–1810, pp. 536–537; mills, size, 452–453, 461; Napoleonic Wars, 536; negro operatives, 399; North Carolina, 459; organization, 357, 533, 551, 552; output and costs, 432–433; overproduction, 308, 544–545, 550, 552–553; Philadelphia, 43, 183, 190–191, 549, 551, 559; Pittsburgh, 339–340; plantation, 535; prices, 141, 345, 362, 386–387, 388; print cloths, 546, 547–549; profits, 309, 373–376, 553; prosperity, 308–309; Providence, 534, 549, 550; Richmond, 538, 552, 558; Rhode Island goods in West, 343; shirtings, 386–387, 388; South, 537–538, 541, 552, 556–558; South Carolina, 198, 425, 459, 533, 537, 552, 556–557, spindle increase, 544, 552, 553; spindles in Ohio Valley, 558; spindles near Providence, 538; spindles in South, 558; spindles in United States, 535, 541, 544, 551, 552, 558; spinning costs, 387–388; standard fabrics, 534, 539–540; steam mills, 559; tariff, 271, 274–275, 278, 279, 282, 307, 309, 547, 550, 553; Tennessee, 342; unfair competition, 240; Virginia, 209; warps, 535, 600; weaving, costs, 388–389; weaving, hand-loom, 549–550; weaving, household, 539; West, 538, 542–543, 552, 558; yarn, 346, 541, 543, 558, 559, 560.

Council of Trade, 15.

Courtlandt Mills (N. J.), 179.

Coventry Cotton Mill (R. I.), 379, 541.

Coventry Forge (R. I.), 44, 496, note 1.

Coxe, Tench, 231, 389, 463, 625.

Craft Societies, 5, 66, 161, 162, 164.

Credits, crisis of 1837, p. 380; manufactures and raw materials, 366; terms, 365–366.

Crèvecœur, Michel St. Jean de, 340, 625.

Crises, colonial, 128, 134; 1785, pp. 61, 227–229; 1816–1820, pp. 275, 379–380, 539, 540, 541, 545; 1829, pp. 545, 566; 1837, pp. 246, 282, 285, 380–381, 550; 1857, pp. 246, 285, 381–382, 553; cotton industry, 249, 379, 382, 383; currency inflation, 384; England, 240; English and American related, 248–249; Essex County, 535; general, 378–385; importations, 246, 384; iron industry, 373, 383–384; Philadelphia and Pittsburgh, 379; price changes, 382–383; woolen manufactures, 379, 381, 382.
Crompton, William (inventor), 429, 570.
Crompton Loom Works (Worcester), 520.
Cromwell, Oliver, 13, 17.
Crowinshield, Richard C. (woolen manufacturer), 563.
Cuba, 360.
Cumberland County (Ky.), 494.
Cumberland Valley (Tennessee-Kentucky), 341, 499.
Cundall, William (woolen manufacturer), 44.
Currency (Money), 125–126, 135; inflation, 378–379, 384; legal-tender laws, 44–45, 126; more abundant after 1790, pp. 364–365; paper, 125–128, 148; purchasing power, 135–136; scarcity, 124, 128, 134, 285–286, 366.
Currying, see *Leather*.
Customs, see *Tariff*.
Cuthbert, John, 49.
Cutlery (see *Tools*), 252, 522–523.

Danbury (Conn.), 464.
Danforth, Charles (inventor), 426.
Danvers (Mass.), 157, 563.
Danville (Pa.), 512.
Davis, Thomas (weaver), 601.
Dayton (Ohio), 542.
Dedham (Mass.), 429, 573, 575.
Deere Plow Works (Moline, Ill.), 517.
Delaware, cotton, 84; cotton manufactures, 551; cotton spinning, 543; cloth printing, 547; iron works, 496; laws, 64, 265; machinery, 519; profits, 375, 376; woolen manufactures, 567.
Delaware County (Pa.), 567, 570.
Delaware River, 508.
Delaware Valley, flax, 82; iron, 499; linen, 197; manufacturing advantages, 464; settlers, 2; sheep, 78; ship-building, 470; textiles, 551.
Derby (Conn.), 526.
Detroit (Mich.), 498.
Dickenson, Obediah (duck-maker), 39.
Dickinson, Jonathan, 95.
Dismal Swamp (Va.), 468.
Disston, Henry (saw manufacturer), 522.
Distaff (Rock), 160.
Distilling, bounty, 37; decline in West Indies, 303; depression in Massachusetts and Rhode Island, 128; grain, 230, 318, 480; internal revenue, 58, 302; Massachusetts, 204, 206; New York, 205, 480; Ohio, 480; Pennsylvania, 231, 480; prohibited, 68–69; rum, 20, 97, 114, 139–140, 302–303, 480; tariff influence, 301–303.
Dividends (see *Profits*), 372–378, 553.
Dongan, Thomas (Governor), 26, 69.
Dorchester (Mass.), 196.
Dorchester County (Md.), 131.
Douglas (Mass.), 514, 522.
Douglass, Dr. William, 74, 105, 206.
Dover (N. H.), 545, 546, 548.
Dover (Va.), 331.
Drawbacks, see *Tariff*.
Duck, Boston, 373, 530; bounties, 35, 36; companies, 193; cotton, 531, 549; Exeter, 530; Haverhill, 425, 530; Lexington, 343; lottery, 44; monopolies, 51; Paterson, 325, 531; Philadelphia, 531; premiums, 37; public loan, 42–43; Salem, 530; Springfield, 530; Stamford, 530; Stratford, 530; subsidy, 39; Watertown, 336; Yarmouth, 530.
Dudley, Joseph (Governor), 131–132, 199.
Dumping, 240–241, 311.
Dunbar, Colonel Jeremiah, 204.
DuPont, E. I. (woolen manufacturer), 563.
Dutch, 2, 12, 17, 18, 102, 113.
Duties, see *Tariff*.
Duxbury (Mass.), 40.
Dwight, Timothy, 264.
Dyes and Dyeing, 99, 109, 160, 163, 190, 333, 432, 550.

Eagle Cotton Mills (R. I.), 410.
East Cambridge (Mass.), 394.
East Hartford (Conn.), 216, 535.
East India Company, 4, 182.
East Indies (East Indian), competition, 243, 249; cotton, 320; cotton goods printed in America, 548; drawbacks and duties on cotton goods, 21, 271, 275; price of cotton goods in New York, 238; specie exports to, 238; sugar, 305; trade, 368; use of cotton goods prohibited in England, 12, 21, 110, 204.
Easthampton (Long Island), 78.
Easton (Pa.), 410.
Economy (Pa.), 575.
Education, Industrial, see *Apprentices, Spinning-Schools*.
Electroplating, 527.
Eliot, John, 51.
Elizabeth, Queen, 4, 5, 6, 10.
Elkton (Md.), 561, 562, 565.
Embargo, 234, 238, 272, 273, 534, 536.
England (see *Great Britain*), coal, 331; commercial expansion, 3; copper, 330; corn laws, 258–259; factory organization, 451; grain imports, 237; locomotives, American, 363; manufactures, 5; mule spinning, 427; prints, 259; salt, 5; saltpeter, 5; silk, 5; silk exports to the United States, 252; skilled immigrants, 393, 398, 400; steamboats, iron, 469; tin plates, 330; wages, 156, 389, 392, 393, 394; weaving, 430; wool imports, 81; woolens exported, 11, 21.
Enumerated Commodities, 17.
Ephrata (Pa.), 186–187.
Erie Canal, 347, 348, 350; lumber, 467; Ohio iron, 347–348; ships, 470.
Erie Railway, 509.
Esopus (N. Y.), 178.
Esopus Creek (N. Y.), 514.
Essex County (Mass.), 488, 535, 567.
Essex County (N. J.), 538.

Essex County (Va.), 38.
Evans, Oliver (inventor), mill machinery, 179; patents, 49; steam engines, 409, 507, 509.
Evesham Iron Works (N. J.), 45.
Exchange, encouraged colonial ship-building, 95; cotton costs, 319; cotton trade, 243.
Excise Laws, see *Internal Revenue*.
Exeter (N. H.), 530.
Exhibitions of Manufactures, 217, 422, 518.
Exports (see also *Tariff*), agricultural from colonies to England, 10; beer, 99; brick, 98; bullion, 286; candles, 97, 99, 301; cards, 222; clocks, 363; cotton, 84; cotton goods, 362, 550; flaxseed, 82; flour, 87, 97, 99, 237, 259, 361; furniture, 99, 472, 473; hats, 23, 99, 204, 206; influence on manufactures, 253, 363; iron, 96–97, 99; laws, 53–56; lead, 329–330; locomotives, 362–363; lumber, 94–95, 98; naval stores, 96, 99; potash, 97; pottery, 99; provisions, 99; reëxports, 238, 245; rum, 97, 303; ships, 95, 98, 204; shoes, 99; soap, 97, 99; sugar, 304, 305; textile machinery, 519; vehicles, 99, 476; whale-oil, 97; wool, 80, 81, 294, 323, 324.
Expositions, 422.

Factories (factory system), antecedents, 7, 188, 192–193; combined processes, 451; first true factory, 450; influence on production, 455; labor system, 454–455; legislation, 264; origin and development, 447–451; prejudice against, 264; watch-making, 454.
Fairbanks, Thaddeus (inventor), 518.
Fairs, 68, 127.
Fall River (Mass.), central control, 458; cotton manufacturing, 358, 368, 539, 544, 559; labor, foreign, 398; linen factory, 532; looms, power, 541; machine shops, 520; power transmission, 411; turbines, 407; wages, 395.
Fall River Cotton Manufactory (Mass.), 374.
Fall River Iron Works (Mass.), 373, 406, 514.
Fall River Print Works (Mass.), 548.
Falmouth (Me.), 204.
Faneuil, Peter, 146.
Farmington (Conn.), 225.
Fauquier, Francis (Governor), 209.
Fayetteville (N. C.), 537, 552.
Files, 523.
Fillmore, Millard (President), 288.
Firearms, 192, 221–222, 231, 419–420.
Fisheries, 85–86, 100, 132.
Fitch, John (inventor), 49.
Flannel, see Woolen Manufactures.
Flatboats, 356, 471, 482.
Flax, bounties, 33, 34; centers of cultivation, 82, 530; decline in cultivation, 439; displaced by cotton, 441, 449; duties, 59, 289; imports, 116, 325; legal tender, 44–45; machine, 50; preparation and spinning, 159–160; price, 142; product in United States, 325; Virginia, 82, note 1, 195.
Flax Manufactures, Baltimore, 191; Boston, 188–189, 530; bounties, 35, 36; Carrollton, 191; Census of 1810, pp. 253, 529; colonial, 201, 202; Connecticut, 373; damask, 531; Delaware Valley, 197; dowlas, 110; duck, 530–531; Dudley, 532; duties, 271; Fall River, 532; Georgetown, 191; Hollands, 110, 141; household, 440–441, 449; Hudson, 531; imports, 110; intercolonial trade, 116; jennies, 425; Kentucky, 341; linen mills, 208, 531–532; lockram, 110; Londonderry, 141, 154, 200, 207; Massachusetts, 204, 532; Napoleonic Wars check, 536; New Hampshire, 203, 207; New York, 190, 198, 208, 218, 531; non-importation, 218–219; Ohio Valley, 531; osnaburgs, 110, 141; Paterson, 325, 531; Pennsylvania, 37, 212; Philadelphia, 183, 188, 190, 209, 217, 531; Pittsburgh, 531; premiums, 37, 39; prices, 141; profits, 373; product in 1850 and 1860, p. 532; Schaghticoke, 531; sheetings, 141; shirtings, 141; Somerset County, 201; South, 223; spinning costs, 387; table cloths, 531; toweling, 531; Virginia, 37, 198; western linens in eastern trade, 344, 345.
Flaxseed, 82.
Fletcher, George, 48.
Florence (Ala.), 558.
Florida, manufactures, 210; steam engine, 409; sugar, 489–490; tobacco, 488.
Flour, Bolting Act, 52; depression in West Indies, 131; exports, 87, 97, 99, 237, 259, 360–361; freights, 338, 349; grinding, 64; inspection, 64–65; intercolonial trade, 113; localization, 76–77, 317–318; prices, 52, 139, 336–337, shipped via Potomac, 339; speculation, 179; tariff, 257, 259; Virginia, 317, 318.
Farmingham (Mass.), 570, 573.
France, colonial policy, 15–16; colonial trade with New York, 211; competes with England, 11; exports to Unived States, 249–250, 251; inheritance law, 69; imports colonial wool, 80; imports flour and tobacco, 227; paper machinery, 262; settlers in Ohio Valley, 341; textile machinery, 431; turbines, 262; woolen manufactures, 243; worsteds, 251.
Frankford (Pa.), 548.
Franklin, Benjamin, acquired fortune in manufacturing, 146; apprentices, 68; encouraged calico printing at Philadelphia, 547; inland freights, 90; labor, 152; lamp, 492; letter to son regarding manufactures, 211; manufactures, 211, 213, 218; Ohio settlements, 28; paper manufacturer, 168; Pennsylvania imports, 120; wool supply, 81.
Franklin, William (Governor), 209, 211, note 2.
Franklin Institute, 407.
Frederick, also *Frederick Town* (Md.), 32, 107, 400, 562.
Fredonia (N. Y.), 494.
Free Trade, see *Tariff*.
Freights, coastwise, 90; cordage, 342; cotton, 319, 337; decline in cost, 385; decreased by railroads, 388; discriminations, 349; flour, 338; influence of canals, 347, 349, 350; New England, 90; New York, 88; ocean, 18, 36, 88, 89; overland during War of 1812, p. 337; overland per ton-mile, 337–338; Pennsylvania, 88; via Pittsburgh and New Orleans compared, 350; wheat, 88.
Frontier, 224, 355.

Fulton, Robert (inventor), 505.
Furnace, see *Glass, Iron, Potash*, etc.
Furniture, chairs, 231, 472, 473; colonial production, 111; exports, 99, 472, 473; general, 472–474; machinery, 473; Southern imports, 205; specialization, 473.
Furs, 23, 288.

Galena (Ill.), 329, 330.
Gallatin Report on Manufactures, 531, 562, 625.
Gardner (Mass.), 473.
Gas, 494.
Gee, Sir Joshua, 173.
Geissenhainer, F. W. (inventor), 412–413.
Genessee Valley (N. Y.), 230, 317, 519.
Geneva (N. Y.), 338, 392.
Georgetown (Ky.), 532.
Georgetown (Md.), 191, 335.
Georgia, corporation law, 555; cotton, 84–85; cotton mills, 459, 537, 552, 556, 557; duties, 60; factory exempted from taxes, 555; founding, 2, 10; Georgia plains, 433; iron, 497; iron-rolling, 514; leading cotton-mill State in South, 558; lottery, 44; lumber, 468; manufactures, 210; patent, 49; petition to encourage cotton manufactures, 554; profits, cotton mill, 375; report on manufactures, 555; silk, 10, 154; sugar, 489; yarn shipped to China, 557.
Germantown (Mass.), 43, 154, 208.
Germantown (Pa.), 93, 154, 186, 206.
Germany (German), axes, 522; capital, 147, 400; glassmakers, 169; immigrants in New York, 42, 201, 208; immigration after 1848, p. 285; iron-masters, 76, 170; knit goods, 251; laborers, 11, 153–164, 391, 400; steel, 517; wool, 250; woolens, 251.
Gettysburg (Pa.), 475.
Glass Manufactures, Albany, 231; Boston, 332; capital, 146, 147, 400; Cincinnati, 346; Confederation, 231; duties, 271, 275; East Cambridge, 341; flint, 169; Fredericktown, 400; Germantown, 43–44; Jamestown, 169; labor from Europe, 400; machinery, 417; Mannheim, 169; monopoly, 5, 51; New Jersey, 146, 169, 203, 209, 211; New York City, 209; obstacles, 168–169; Pennsylvania, 209, 231, 340, note 5; Pittsburgh, 339, 340; Quincy, 208; Salem, 41, 42, 152, 169; Virginia, 10, 11; wages, 394; window glass in England, 5.
Globe Cotton Mills (Fall River), 373.
Gloucester (Mass.), 41.
Gloucester Print Works (N. J.), 267, 559.
Gloversville (N. Y.), 464.
Gold, see *Currency, Specie*.
Goodyear, Charles (inventor), 435.
Goulding Condenser, 423, 434, 565.
Graniteville (S. C.), 459, 557.
Great Britain (see *England*) colonial policy, 14–16; commercial policy, 16–17, 228, 360, 554; copper, 330; drawbacks on goods shipped to colonies, 21, 204; excise on printed cloths, 259; exports to United States, 246–253; hardware, 524; imports hand cards, 222; imports from colonies, 94–97; individual ownership, 462; iron manufacturing, 412; iron trade with colonies, 96–97; labor from, 273, 398, 399–400; laws prohibiting export of machinery and emigration of artisans, 260; laws regulating American trade with colonies, 257–258; lumber duty removed, 94; lumber imports, 95; lumber premiums, 94; lumber trade of colonies prohibited, 94; machine-shops, 418–419; machinery, 436; manufacturing advantages, 243; navigation acts, 16–19; 257–258; prevents exports of textile machinery, 533; prices, American iron, 386; restrictions on American commerce, 254–258; steam and water power costs as compared with United States, 410; steel, 517; tariff relations with the colonies, 16–17, 19–21; tariffs on food and raw materials, 250, 258–259; tools and hardward from, 524; tonnage exceeded by American, 472; steam tonnage, 471, note 4; steel from, 516; wages compared with United States, 389–397; wool duties, 250, 292; wool imports, 81, 250; wool manufacturing costs, 292–293; woolens exported to U. S., 248, 250, 251.
Great Falls Cotton Manufacturing Company (Somersworth), 546, 566.
Great Lakes, influence on manufactures, 348; lead, 349; lumber trade, 467; ore, 348–349; ship-building, 469, 470–471.
Great Western Iron Company (Pa.), 446.
Green, Griffin (iron-master), 44.
Green Bay (Wis.), 467.
Greenup County (Ky.), 332.
Greenwich (N. Y.), 536.
Gregg, William (cotton manufacturer), 556–557
Groton (Mass.), 41.
Grover and Baker Company (Boston), 521.
Guilds (see *Craft Societies*), 5.
Guilford County (N. C.), 219.
Gunpowder, bounties, 36; Dorchester, 196; duties, 271; Kentucky, 341; mill, 180; Missouri, 341; Ohio Valley, 345; Pennsylvania, 222, 231; Revolution, 222.
Gunshops, 192.
Gurleyville (Conn.), 575.

Hadley (Mass.), 90.
Hagerstown (Md.), 107.
Hague, John, 43.
Halifax (Nova Scotia), 257.
Hallowell (Me.), 539.
Hamilton, Alexander, cost of importing, 284; iron manufactures, 500; iron prices, 139; lack of transportation, 353; promotes Paterson, 404, 448; report on manufactures, 195, 239, 625.
Hamilton Company (Lowell), 374, 453, 546.
Hamilton Company (Southbridge), 453.
Hampshire County (Mass.), 572.
Hampton, Wade, 489.
Hancock (Mass.), 564.
Hanging Rock Iron District (Kentucky—Ohio), 499.
Hardware, 92, 252, 523–525.
Harmony (Pa.), 563.
Harper, John (saw manufacturer), 522.

Harper's Ferry (W. Va.), 421.
Hartford (Conn.), 90.
Hartford Woolen Manufactory Company (Conn.), 448, 560; buys foreign wool on credit, 366; carding machinery, 423; household spinning, 561; jennies, 425; lottery, 44; profits, 373, 448; tax exemption, 45; wages, 387, 388, 395; worsted warps, 572.
Harvesters, 478.
Hasenclever, Peter, 147; iron works, 174; mill improvements, 175; non-importation, 217–218; steel, 221.
Hats, British laws, 23, 204, 205; Carolina, 142, 205; colonial, 77, 110; duties, 271, 288; exports, 23, 204, 206; hatters' petition for charter, 66, 204; intercolonial trade, 117; machinery, 430, 433; Massachusetts, 55, 201, 204, 206; New Jersey, 205; New York, 205; New York City, 209; prices, 142; Virginia, 209; wages, 394.
Havana, 341.
Haverhill (Mass.), duck factory, 425, 530; land grant, 41; mills and shops, 186.
Hawaii, 368.
Hawes, Marvel and Davol (Fall River), 520.
Hawxhurst, William (colonial iron-master), 221
Haywood, Daniel (cloth manufacturer), 191.
Hazard, Rowland G., 433.
Hazard, Thomas (woolen manufacturer), 377.
Hemp, bounties, 24, 33, 34; centers of production, 82; domestic production, 326; duties, 21, 288–289; imports, 25, note 1, 34, 112, 318, 326; Kentucky, 326, 341, 342, 346; legal-tender, 44, 45; preparation, 159; subsidy, 39; used in Georgia plains, 433; Virginia, 195.
Hemp Manufactures, general, 532; Kentucky, 342.
Hempstead Heath (Long Island), 78, 216.
Herzog, Joseph, 343.
Hessians, 220, 226.
Hewes, Robert (packer), 482.
Hewson, John (calico printer), 43, 192, 547.
Hibernia Iron Works (N. J.), 45.
Hides, duties, 300–301; export forbidden, 53–54; on free list, 288; West Indian, 167.
Hoboken (N. J.), tubular boiler, 408, footnote.
Hocking Valley (Ohio), 498.
Hoe and Company (N. Y.), 418.
Hoes, 115, 205, 209, 477.
Holland, colonial policy, 15; competes with England, 11; mills, 180; skilled labor, 154.
Hollands, see *Flax Manufactures*.
Holmesburg (Pa.), 519.
Holyoke Power Company (Mass.), 382, 408, 559.
Homespun Company (Charleston), 538.
Homespun Industries, characteristic of frontier, 355; Connecticut, 563; decline deplored, 280; decline with second generation of settlers, 118–119, defined, 92, 438; early colonial, 196–200; food preparation, 440; geography after 1815, 438–439; New York, 439, 566; prices, 141; relation to foreign competition, 252–253, 357–358; revived by machinery, 439; Salem, 563; sale forbidden, 15; South, 209; Tennessee, 439; used by fisherman, 100.
Hope Distillery (Louisville), 368.
Hopkins, Jeremiah (gun-maker), 44.
Horstman, William H. (silk manufacturer), 575
Houghton, Rowland (instrument-maker), 48.
Housatonic Valley (Connecticut—Massachusetts), 499.
Household Manufactures, boots and shoes, 163, 441; defined, 440; garments, 441; knit goods, 441; lace, 441; linen, 163, 440, 441; nails, 441; Virginia, 195; weaving for mills, 538–539, 574.
Houses, 91, 98.
Hubblefield, William (cloth-maker), 40.
Hudson (N. Y.), canvas, 531; overland trade, 336; prints sold as English goods, 550; print works, 548; whaling, 335.
Hudson Iron Company (N. Y.), 377–378.
Hudson Valley (N. Y.), cotton mills, 538, 551; distilling, 480; flax center, 82; iron, 498, 499.
Humphreys, General David, 264, 561, 563.
Humphreysville (Conn.), 453, 546, 562.
Humphries, Whitehead (steel manufacturer), 43.
Hunter, Robert (Governor), 58, 199.
Huntsville (Ala.), 346, 558.

Iceland, 321.
Illinois, agricultural machinery, 478–479; castor oil, 493; French export wheat and flour, 113; iron, 498; lead, 295; packing, 484.
Imitations and Counterfeits, 241, 362, 433, 550.
Immigrants (see *Labor*), 11, 153–154, 191, 196, 273, 398, 399–400, 535–536, 569.
Imports (see also *Tariff, Cotton, Iron, Wool*, etc.), alum, 112; auctions, 241–242; axes, 522; barilla, 333; beer, 59; bristles, 327; bullion, 99; cards, cotton and wool, 112; China silk, 252, 327, 576, 580; cloth, 210; clothing, 111; coal, 90, 331; consumption, 245–246; copper, 330; copperas, 112; cordage, 112; cotton, 32, 77, 83, 212, 320; cotton goods, 110, 246–250, 553, crises, 61, 227, 274, 284, 287, 311, 379; 380, 384; decline due to non-importation, 215–216, 585 decline in Massachusetts, 131–132, 196–197; flax, 116, 325; fluctuation, 120; from Great Britain, 247; hemp, 25, note 1, 34, 112, 326; indigo, 333, 550; iron and steel, 96–97, 112, 139, 246, 247, 252, 298–299, 300, 329, 516–517; iron steamers, 469; lead, 112, 329–330; linen, 33, 110, 196, note 1; not governed by tariff, 311–312; Pennsylvania, 119–120; per capita, 120–121; porcelains, 112; prints, 259, 553; proportion of British manufactures rising, 121; ratio to population, 119; raw materials, 112; reëxported, 245; sailcloth, 112; saltpeter, 333; silk, 251–252, 326–327, 576, 580; sugar, 491–492; sulphur, 112, 333; tallow, 327; tin, 112; tools and hardward, 112, 524; whale-oil, 327; wool, 77, 100, 290, 295, 321, 322, 323, 324, 561, 566; woolens, 109–110, 132, 210, 246, 247, 248, 250, 251, 253, 362.
India Goods, see *East Indies*.
Indian Trade, 58, 100, 477.
Indiana, cotton mills, 542; iron, 498; packing, 484.
Indigo, 36, 160, 333, 550.

Industrial Education, 67.
Industry, see *Manufactures*.
Inspection Laws, 64–66, 263.
Inspectors of Manufactures, 6.
Insurance, 89.
Interchangeable Mechanism (see also *Machinery*), 416, 419–420, 474–475.
Interest Rates, 147–151, 367.
Internal Revenue, 58, 274, note 2, 302, 304–305, 500.
Inventions, American, 48–49, 175, 180, 262, 314, 401, 412, 415, 416, 417–418, 421, 422, 423, 425, 426–427, 428, 429–430, 431, 432, 435, 469, 490, 492, 509, 517, 518, 520–521, 522, 523, 526, 576; borrowed from abroad, 260–262; British, 7–8, 160, 192, 224, 262; British view of American, 435–436; conditions favoring, 53.
Ipswich (Mass.), 41, 561.
Ireland (Irish), colonial trade forbidden, 14, 17; cotton manufactures, 240; flax imports from, 325; flax machine, 50; flax manufactures, 12, 110; imports American flaxseed, 82, 585; imports lumber, 95; laborers, 391, 398; skilled spinners, 134, 154, 191, 200, 201, 203, 206, 398, 400; sympathy with American Revolution, 225; tinsmith, 523; weavers, 400; wool, 81; woolen manufactures restricted, 18, 22.
Iron and Steel (see also *Labor*, *Nails*, *Prices*, *Profits*, *Stoves*, *Tariff*), anchors, 220, 505, 506; association of iron-masters, 184; automatic machines, 420; axes, 209, 212, 417, 475, 513, 522, axles, 517; bloomeries, 169, 170, 220, 413, 502; bolts, 475; boiler-plates, 510; canal, influence, 349; capital, 146–147, 152, 173–174; car-wheels, 504–505; castings, 171, 212, 416–417, 502–504, 505, 506; coal, 331, 332, 412–413; coke, 413; colonial plants, 169–171; Connecticut, 208, 220, 221, 377, 496, 503, 506, 515, 516, 517, 522, 523, 524; consumption, 329, 359–360, 496; cost of production, 385–386; crises, 373, 383–384, 499–500; Delaware, 496; English and American shop practice compared, 418; English manufacture restricted, 10; export forbidden, 54; exports, 96–97, 99; forges, 171–172, 414, 416, 417, 506–507; foundries, 171, 415, 502–505; freights, 89, 90; furnaces, 169, 170–171, 206, 412–414, 416; galvanized, 513; geography, 328–329, 496–499; Georgia, 497, 514; hardware, 252, 523–525; Hasenclever, 147, 174, 221; Hessian labor, 220; hot blast, 412, 413, 497; imports, 112, 139, 246, 247, 252, 298–299, 300, 329–330; imports, ratio of manufactured and unmanufactured, 298–299; interchangeable mechanism, 416–419, 474–475; James River, 11, 173; Kelly's process, 261, 415–416; Kentucky, 340, 341, 498, 499; laws, British, 23–24, laws, colonial, 69; loss of capital, 373; Lynn, 40, 54, 76, 138, 146, 153, 156, 170, 172–173, 182; machine parts, 416; machine tools, 417–419; Maine, 497; malleable iron, 416; Maryland, 40, 97, 173–174, 220, 413, 497, 499, 500, 501, 512, 513, 514; Massachusetts, 91–92, 169, 171, 196, 201, 204, 206, 221, 496, 497, 510, 515, 516, 517, 518; Michigan, 348, 497, note 1; Missouri, 498, 499; nails and nail-making, 114–115, 161, 204, 222, 271, 339, 340, 341, 441, 515–516, 518; negro labor, 220, 399, New Hampshire, 40, 154, 200, 296, 377, 385, 497; New Haven, 45, 69, 92; New Jersey, 45, 209, 221, 296, 385, 496, 497, 498, 500, 501, 502, 504, 511, 512, 514, 516, 517; New York, 171, 205, 221, 378, 386, 500, 501, 504, 512, 515, 516, 517; North Carolina, 219, 497, 499; Ohio, 347–348, 377, 385, 413, 497, 498, 499, 501, 515; ore, 10, 54, 75–76, 91, 92, 170, 195, 206, 328–329, 347, 348, 349, 496–497, 498, 499; organization, 172–173, 182, 445, 446, 462; Pennsylvania, 69, 76, 96–97, 296, 323, 329, 373, 377, 385, 386, 393–394, 497, 499, 500, 501, 502, 503, 510, 511, 512, 513, 514, 515, 516, 517; Pennsylvania and New Jersey ore used in New England, 496; pipes, 504; planers, 418, and note 3; prices, 138–139, 300, 385–386; price agreement, 458, note 5; Principio, 91, 92, 146, 147, 173–174, 182; product, 328, 499, 500–501; profits, 373, 377–378; puddling, 414, 511, 512, 513, 514; quality, 201, 501; railroad car, 509; railway iron, 511, 512–513, 514, 515; rank of states, 500, 501; reason for colonizing America, 10; refining, 206, 414–415; Revolution, 219–222; Rhode Island, 44, 205, 208, 221, 496, 516; rolling and slitting mills, 24, 51, 170, 172, 204, 209, 211, note 2, 510–515; sheet, 170, 513; shipped via Potomac, 339; ships, 469; slide lathe, 417; slow technical progress, 412, 414; South Carolina, 219–220, 497, 514; Spottswood's furnace, 91, 92, 154, 173; steamboats, 469; steam engines, 505–509; steam hammer, 417, 507, note 2; steel, 43, 50, 171, 208, 209, 221, 231, 297, 415, 516–517; Stiegel, 147; stoves, 115, 347, 377, 412, 502–504; structural, 504, 514; tariff, 20, 271, 275, 278, 279, 282, 296–300, 310; tariff petition, 296; Tennessee, 342, 497, 499, 501; Texas, 498; trade, flatboat, 356, and note 3; trade, intercolonial, 114–115, 206; trade with Great Britain, 96–97; trade with West Indies, 99; uniform shapes, 419; Vermont, 498; Virginia, 11, 97, 146, 171, 205, 209, 219, 385, 499, 514; wages, 393–394; water-wheels, 406, note 4, 407, 416; wire, 517–518.
Iron Mountain (Mo.), 498, 499.
Irwell River (England), 404.
Italy, 3, 11.

Jacks, *Spinning*, 425, 428.
Jamaica, 98, 303.
James, *I.*, 5.
James River (Va.), 2, 173, 179, 558.
Jamestown (Va.), 67, 105, 169, 188.
Jay Treaty, 256.
Jefferson, *Thomas*, 312, 399, 476.
Jenks, *Alfred*, *and Sons* (Philadelphia), 519, 520.
Jenks, *Joseph* (iron-worker), 48, 175, 475.
Jenny, *Spinning*, 190, 191, 192, 223, 424–425, 534, 561, 565.
Jerome, *Chauncey* (clock-maker), 381.
Jersey City (N. J.), carpets, 568; car-wheels, 505; cast steel, 415, 517; engine works, 505.
Jewelry, 99, 527–528.

Johnson, Robert (Governor), 96, 198.
Johnstown (Pa.), 515.
Juniata Valley (Pa.), 497, 511.

Kalm, Peter, 624; canning, 485; cotton, 83, 84; firearms, 221; Germantown, 206; Indian kettles, 100; mechanics, 16; mill machinery, 175; New Jersey trade, 114.
Kansas, 499.
Keene (N. H.), 41, 42.
Keith, Sir William (Governor), 201–202.
Kelly, William (iron-maker), 261, 415–416.
Kennebec River (Me.), 2.
Kentucky, company to promote manufactures, 266; cigar-making, 488; cotton mills, 542; flax, 341; Gazette, 340; hemp, 289, 326, 342; hemp manufactures, 532–533; iron, 340, 341, 498, 499; jeans, 441; linen, 440; manufactures, 230, negro labor, 341, 399; packing, 484; paper, 341; Rhode Island yarn, 356; saltpeter, 315, 333; sugar, 341; textile machinery, 519.
Kerosene, 494.
Kilburn, George (inventor), 407.
Knight Family (cotton manufacturers), 458.
Knitting, Germantown, 93, 206; imports from England and Germany, 251; knit goods, 189, 207, 208, 441; machinery, 430, 559, 563.
Kuhn, George (woolen manufacturer), 376.
Labor, affects spinning practice, 428; American, characterized, 401; carpet weavers from Kiddiminster, 569; changed organization in cotton mills, 540; child, 189, 264, 396, 397–398; cigar-making, 488; cost of spinning and weaving, 387–389; cost prevents silk raising, 575–576; division in machine shops, 419; effect of war, 134; factory, at Waltham and Lowell, 397; factory, in Rhode Island, 397; factory, source, 391; factory system, 454–455; immigrant, during non-intercourse, 273; immigrant, established new industries, 153–154; immigrant, in textile mills, 398; immigrant, in Virginia, 11; immigrant, Irish spinners indentured, 191; immigrant, skilled, 391, 399–400; immigrant, spinners, 535–536; importance of skill, 82, note 1, 153; iron-workers, 153, 154, 220; manufacturing, in Great Britain and United States, 244; negro, 23, 155, 195, 220, 341, 399, 486, 555; non-intercourse, 273; packing, 484; pauper, 398; ratio to machinery in cotton mills, 553; relation of predominant industries and labor supply, 466; Revolutionary prisoners, 226; scarcity, 152–153; specialization in shoe-making, 444; textile, 153–154, Waltham, 450; white operatives in South, 557.
Lace, 441.
LaClede Iron Works (St. Louis), 514.
Lake Champlain, canal to Hudson, 347; hot blast bloomeries, 412, 497; iron, 315, 328.
Lake Ontario, 338.
Lake Superior, 328, 348, 498.
Lakeville Furnace (Conn.), 220.
Lampblack, 205.
Lamps, 492–493, 494, 526–527.
Lancashire (England), 273.
Lancaster (Pa.), manufacturing center, 89, 185–186; rifles, 221, 345.
Lancaster County (Pa.), 512.
Land Grants, 39–42, 266.
Lawrence (Mass.), corporation abuses, 460–461; dam, 406; failures, 461, 463; founding, 405–406, 559; machine shops, 520; woolen mills, 453, 571.
Lawrence Company (Lowell), 546.
Laws (see *Bounties, Inspection, Land Grants, Legal Tender, Navigation Acts, Patents, Stamp Act, Subsidies, Tariff, Taxation*).
American: bounties, 33–39, 110, 470, 530, 575; colonial tariff, 56–63; compulsory manufactures, 31–32; corporation, 265–268, 555; disallowed by Great Britain, 26–27, 45, 57; export regulations and tariffs, 53–56; import duties, 56–60; Indian trade, 100; inspection, 64–66, 263; land grants, 39–42; legal tender, 44–45, 126; liquor, 69; loans, 42–43; lotteries, 44; market, 64, 68; mills, 63–64; monopolies, 50–53; patent, 47–50, 312–313; premiums, 37–38; public industries, 32, 219–220; State aid to manufactures, 263; subsidies, 38–39, 44, note 6; tax exemption, 41, 45–47, 69, 555; toll, 63–64; tonnage, 60; town, 60.
British: affecting American manufactures, 16–27; authorities veto colonial laws, 26–27, 45, 57; bounties on colonial products, 24–25; currency, 125, 585; effects, 25; free trade, 145, 258; hat, 23; iron, 23–24, 221; navigation, 12, 13, 16–19, 255, 257–258; to prevent exportation of artisans and exports of machinery, 25, 260; Sugar Act, 20; woolen law, 1699, p. 22.
Lead, colonial, 76; duties, 288, and note 4, 295; exports, 329–330; imports, 112, 329–330; Missouri, 315, 341; product, 329–330; red lead, 344; St. Louis, 330; shipped via Milwaukee, 349; white lead, 344, 346, 353; Virginia, 295, 315; Wisconsin, 349.
Leather and *leather manufactures*, duties, 55, 271, 300–301; exported to West Indies, 99; export prohibited, 53–54; inspection, 66; intercolonial trade, 115; manufactures, 212, 495; Massachusetts, 201; price, 142; process of manufacture, 167; quality, 209; Virginia, 55, 195.
Lebanon (N. H.), 561.
Legal Tender Laws, 44–45.
Lehigh Valley (Pa.), 497, 499.
Lexington (Ky.), bagging, 343, 346, 532; cordage, 345; cotton mills, 346, 538, 542; duck, 343, 532; early industries, 340–341; Licking River, 340; steam-engine, 409; textile machinery, 342; woolen mills, 563.
Lincolnton (N. C.), 538.
Linen, see *Flax Manufactures*.
Lippitt Cotton Mills (R. I.), 373, 379.
Lisbon (Portugal), 94.
Litchfield (Conn.), 507.
Litchfield County (Conn.), 499, 516.
Little Cambridge (Mass.), 482.
Little River (Ga.), 556.
Liverpool, 550.
Livingston, Robert, Jr., 91.

Livingston Mills (N. Y.), 176.
Lockport (N. Y.), 494.
Lockram, see *Flax Manufactures*.
Locks and Canals Company (Lowell), 405, 508.
Locomotives, 362–363, 508–509.
Logan, James, 131.
Logwood, 343.
London, American iron quoted, 296; Crystal Palace, 422, 518; iron worker's petition, 24; manufactures, 12; merchant's petition, 22; Society of Arts, 38, 175.
Londonderry (N. H.), linen, 66, 93; skilled immigrants, 154, 160, 200; value of manufactures, 207.
Long Island, freight, 90; population, 3; tide mills, 174; woolen manufactures, 198, 216.
Long Island Sound, 169.
Longstreet, William (inventor), 49.
Lonsdale Cloth Manufacturing Company (R. I.), 553.
Looms (see *Machinery*), affect fabrics, 433–434; carpet, 570; colonial, 160; cotton mills, 540–541; Crompton, 429, 432, 433; fly shuttle, 160, 428; hand-looms, 550, 574; Jacquard, 431, 569; improvements, 428–430; power, 262, 541; power-looms and factory development, 447; power-looms for woolens, 565; power-looms and standardize fabrics, 434; profits, 370; revive cotton industry, 379.
Lopez, Moses (chandler), 184.
Lords Commissioners for the Plantations, 13.
Lords of Trade, see entries under *Board of Trade*.
Lorillards (tobacco manufacturers), 487.
Lotteries, 43–44.
Louisiana, cotton, 85, note 1; lumber, 98, 468; manufactures encouraged, 16; ship-building bounty, 470; steam-engines, 409, 410; sugar, 318, 490–491; sugar duties, 301, 302.
Louisville (Ky.), built with materials from Pittsburgh, 107; candles, 492, note 2; capital in cotton manufactures, 558; cotton yarn from Lexington, 346; distilling, 368; engine works, 409, 507; packing, 484; steam boats, 340, 471; sugar-refining, 491.
Lowell (Mass.), carpets, 568; central control, 458; cost of steam and water power, 410; factory system adopted in South, 556–557; founding, 404–405, 466, 545; horse-power, 405; labor system, 397; land values, 405; locomotives, 508; looms and spindles, 405, 546, 550, 552, 553; looms, fancy and carpet, 429–430, 570; machine-shops, 434, 466; manufacturing companies, 546; mill powers, 405; mule spinning, 427; native labor, 398; period of service, 398; print cloths, 546, 548; profits, 374–375; railroads, 353; success of manufacturing corporations, 462; textile machinery, 519–520; wages paid in cash, 365; woolen manufactures, 566; woolen mills, 453; worsteds, 573.
Lowell, Francis (inventor), 428, 451.
Lowell Carpet Company (Mass.), 370, 375, 573.
Lowell Company (Mass.), 546.
Lucena, John (soap maker), 50.
Luddite Riots in England, 273.
Lumber (see also *Mills, Saw*), British capital, 147; British duty removed, 20, 94; cabinet woods, 74, 316, 474; cypress, 74; exports, colonial, 94–95; fir, 74; freights, 89; localization, 315–317, 467–468; mahogany, 316; market, European, 94–95; market, island, 98; North Carolina, 95, 209–210; oak, 74, 95; prices, colonial, 136–137; trade with southern Europe prohibited, 94; Virginia, 94, 95, 468; white pine, 73–74, 316, 468; yellow pine, 74, 209, 468.
Lutterloh, Emanuel, 44.
Lynn (Mass.), iron works, 40, 54, 76, 138, 146, 153, 156, 170, 172–173, 182; shoemaking, 186, 187, 345, 444.

McCormick, Cyrus Hall (inventor), 478.
Machinery (see also *Mills*), boot and shoe, 444–445; bur, 324, 422; carding, 423, 519; combing, 423–424; exports, American, 363; export from Great Britain forbidden, 260; jenny, self-feeding, 534; looms, power, 540–541; metal-working, Republic, 416–420; metal-working, Revolution, 222; mill, 175–176; mill, cylinder bearings, 177; printing, 547; power, 565; Providence, 434, 466; shops, 434, 466; speed, 412; spindle speed, 427; spindle product, 432; spinning-wheels, 160; sugar, 115; textile, affects character of raw materials, used, 433–434; textile, affects output and cost of production, 432–433; textile, brought from abroad, 261–462; textile, cards, 567; textile, centers of manufacture, 466; textile, classified, 422; textile, colonial, 159, 160, 163, 191, 192; textile, exported, 519; textile, fly shuttle, 428; textile, general, 518–520; textile, influence on homespun, 439; textile, inventions and improvements, 422; textile, iron used, 415; textile, knitting machinery, 430; textile, laws regarding, 533, and note 3; textile, Lexington, 342; textile, loom improvements, 428–430; textile, mule spinning, 427–428; textile, obtained from Great Britain, 533; textile, Philadelphia, 518, 519, 521, 533; textile, printing, 431; textile, rapid depreciation, 370; textile, throstle spinning, 426–427; transmission of power, 411; United States and Great Britain compared, 436–437; wood used in construction, 416; woodworking, 421–422, 472.
Madeira, 93, 99.
Madison (Ky.), 532.
Madison, James (President), 269, 306.
Mahoning Valley (Ohio), 498, 499, 511.
Maine, carpets, 568; cotton spindle increase, 559; hemp, 82; iron, 497; iron imports, 300; lumber, 467; opposition to iron duties, 297; profits, woolen mills, 376, 377; sawmills, 177; shipbuilding, 469–470; woolens, 567.
Mallison, Joseph (iron-master), 40.
Malt (see *Brewing*), 166.
Manayunk (Pa.), 406, 549, 573.
Manchester (Conn.), 561.
Manchester (England), 5, 84, 393, 395.
Manchester (N. H.), 405, 466, 537, 550.

Mannheim (Pa.), 169.
Mansfield (Conn.), 575.
Manufactory House (Boston), 43, 132, 189, 208, 216.
Manufactures, classified by markets, 92–93; close of colonial wars, 207–211; gross product in 1860, p. 582; hostility in South, 553; influence of railroads, 351; influence of Revolution, 226–227; periods of development after 1790, p. 234; prejudice against, 155; profits, 147, 370, 372, 378; promoted in South, 554–555; report of 1721, pp. 200–202; report of 1733, pp. 202–205; stages of evolution, 7; subordinate to agriculture, 465.
Marietta (Ohio), 340, note 2; 409.
Markets, American cottons in foreign markets, 362; Baltimore, 359; Boston, 358–359; British, 8, 94–97; British goods for foreign markets, 361; cash market lacking, 217; China, 362; colonial expansion, 101; displacement of homespun, 247, 252–253; East Indian, 362; European, 8; foreign markets classified, 93; foreign markets for American manufactures, 253; influence on manufactures, 8; instability, 123; isolation of colonists from markets, 87–88, 201; lumber, 94, 467–468; market laws, 64, 68; motive for colonizing America, 11; Napoleonic wars, 237; New York, 359; organization of a national market, 360; peddlers, 69, 117, 523–524; Philadelphia, 116, 180, 345, 359, 440; population, 102–106; raw materials, 382–383; Spain, 11, 87, 94; Spanish American, 360–361, 362, 363; town, 117; West Indian, 8, 98–99, 230, 237, 255, 257; Wine Island, 8, 99.
Marketing, cost, 358; early difficulties, 356; flatboat stores, 356, and note 3; prejudice against domestic goods, 357–358; sales methods, 356–357.
Marland, Abraham (woolen manufacturer), 376.
Mars Engine Works (Philadelphia), 507.
Martha's Vineyard, 78.
Maryland, canning, 485; carpets, 569; coke smelting, 413; cotton manufactures, 543, 544, 551; crises, 131; duties, 55, 56, 59; firearms, 32; flax, 82; flour, 317; iron, 497, 499, 500, 501; iron trade, colonial, 97; iron works confiscated, 174; iron works during Revolution, 220; laws, bounty, 33, 35, 36; laws, export, 54; laws, legal tender, 45; laws, premium, 37; laws, tax, 46; laws, toll, 63–64; laws, town, 68; linen, 35, 37; liquor not sold to workmen, 69; manufactures, 198; manufactures in 1721, 201; manufactures in 1733, 205, 209; negro operatives, 399; population, 105; premiums, 37; rolling mills, 512, 513, 514; sheep, 79; spinning-schools, 67; tobacco, 487; wool, 23; wages, 393.
Mason, William (inventor), 426, 429.
Mason Machine Works (Taunton), 520.
Masonville Company (Conn.), 375.
Massachusetts (Massachusetts Bay), apprenticeship, 67; bloomeries, 169; candles, 50, 492; capitalization of manufacturing corporations, 266; carpets, 466, 568; corporation abuses, 460–461; cotton, 83, 196, note 1, 201; cotton mills, 536, 559; craft societies, 66; crises, 129–132, 134; cupola furnaces, 171; cylinder bearings, 177; distilling, 480; duck, 36, 39, 43; duties, 56, 57; farm implements, 479; firearms, 221; fire regulation, 68; furniture, 473–474; hatters petition for craft society, 66; hemp, 34, 39; imports, 118, 196, 200; industrial training, 67; iron, 91–92, 196, 201, 206, 300, 496, 497; iron founders petition, 296; land grants to manufacturers, 40; laws, 31; laws, bounty, 34, 35, 36; laws, corporation, 266; laws, export, 53, 54–55; laws, inheritance, 69; laws, inspection, 65, 66; laws, legal tender, 45; laws, mill, 64; laws, monopoly, 47; laws, premium, 37; laws, spinning, 67; laws, subsidy, 39; laws, tariff, 57, 61, 62; laws, tax, 46–47; linen, 35, 37, 43; lotteries, 44; lumber, 468; lumber exports, 94, 95; manufactures, 200; manufactures in 1721, 200–201; manufactures in 1733, 204, 206; manufactures in 1763, 207–208; manufacturing profits, 369; monopolies, 47, 50, 51; nails, 516; paper, 51, 168, 204, 208; patents, 48, 50; petition for remission of taxes, 132; population, 104; potash works, 40, 43, 166; powder, 196; power-looms, 565; printing regulated, 69; prosperity during Revolution, 225; public aid to procute cotton machinery, 533; public loans to manufacturers, 43; railroads, influence, 353; ratio of capital to output, 371; rolling mills, 510, 515; sewing-machines, 522; sheep, 78; ship-building, 66, 153, 204, 206, 208, 470; shoe exports, 116; silk-raising, 326; snuff mills, 487; spindle increase, 544; steel, 221, 516; tar, 51, 65; tariff petition, 296; tariff war, 59; textile machinery, 520; trades prosperous, 196, wages, farm, 392; wages, mechanics', 393; wages, shoemakers', 394; wages, textile, 396; weaving costs, 388; wire, 518; woolen manufactures, 196, note 1, 199, 566–567, 567–568, 569, 571, 574; worsteds, 200, 573.
Materials, see *Raw Materials*.
Mechanics (see *Artisans*), 16, 340, 393, 400.
Memphis (Tenn.), 555, 557.
Mercantile System, 9.
Mercersburg (Pa.), 339.
Merchant Manufacturers, colonies, 163; early factories, 192, 442; England, 4.
Merino Sheep, see *Wool*.
Merrimac Manufacturing Company (Lowell), capital, 546; controlled water-power, 405; dividends, 374, 375; established to make prints, 546; merchant managers, 459; ownership, 460; prints, 548; profits, 374, 375; spindles and looms, 453, 546; stock owned by operatives, 369; textile machinery, 519; water wheels, 406.
Merrimac River (Mass.), 404–406.
Merrimac Valley (Mass.), 82, 551.
Mexico, 125, 361, 362, 520.
Michigan, 330, 497, note 1, 498.
Middlesex (Mass.), 186.
Middlesex Company (Lowell), broadcloth, 572;

cassimeres, 568, 570; failed during crisis, 382; first large woolen corporation, 566; first true factory, 453; largest mill in country, 570; looms, 429; ownership, 457; profits, 370, 377; shawls, 573.
Middletown (Conn.), steam-engine, 409; West Indian port, 335; woolen mills, 453, 562, 565.
Middletown Manufacturing Company (Conn.), 264.
Milford (Conn.), 54.
Mills, bark, 167; colonial, might be operated by one partner, 183; coffee, 524; combine several operations, 446–447; cotton, size, 452–453, 461; defined, 174; flour, capacity, 179; flour, described, 178–179; flour, improvements, 175; flour, inspection, 64; flour, localization, 317; flour, steam, 409; flour, stones, 178; flour, tolls, 63–64; fulling, described, 180; fulling, in colonies, 79; fulling, in West, 341; improvements, 175; laws, 63–64; leather beating, 168; malt, 166, 178; organization, 445; paper, described, 168; paper, exported, 363; persistence of mill manufactures, 452; potter's, 178; powder, 180; profits, southern textile mills, 375; rolling and slitting, described, 172; rolling and slitting, Massachusetts, 204; rolling and slitting, New Jersey, 209; saw, capacity, 176; saw, cost, 177; saw, exported, 363; saw, gang saws, 176; saw, improvements, 177; saw, inspection, 64; saw, localization, 468; saw, machinery, 176, 421; saw, mahogany, 316; saw, steam, 316, 409; saw, veneers, 473; silk, 332; snuff, 487; sugar, made in Philadelphia, 115; sugar, shipped to West Indies, 363; superiority of colonial, 180–181; tan-bark, 167; tide, 174; uses, 175; Virginia, 179, 196; water, described, 175–176; wind, 174; woolen, early, 561–562; woolen, size, 453, 570.
Milton (Mass.), 208.
Milwaukee (Wis.), 349.
Mississippi, 409, 440.
Mississippi River, 471.
Missouri, bagging, 532; exports, 341; industries, 341; iron, 498, 499; lead, 295, 341; saltpeter, 333; sandstone used in Pittsburgh, 344, note 1; vehicles, 476.
Mitchell, Dr. John, 29.
Mobile (Ala.), camphene, 493; lumber, 467, 468; steam cotton mill, 557.
Mohawk River (N. Y.), 338.
Mohawk Valley (N. Y.), broadcloth mills, 572; cotton manufactures, 536; cotton mill labor, 540; manufacturing center, 464; sawmill, 176.
Molasses, duties, 271, 279, 301, 302; evasion of duty, 302; from corn stalks, 50; used in distilling, 99, 302.
Moline (Ill.), 517.
Molineux, William (woolen manufacturer), 189–190, 192.
Moller, William (sugar refiner), 491.
Monongahela River (Pa.), 340.
Monopolies (see *Patents*), colonial, 47–53, 137; Connecticut law, 47; Dutch policy, 47; in England, 5; Massachusetts law, 47; not acquired by manufacturing combinations, 458.
Monroe Doctrine, 269.
Montgomery (Ala.), 558.
Montour Iron Works (Danville, Pa.), 512.
Montville (Conn.), 561.
Moore, Sir Henry (Governor), 208, 210.
Moravians, 186–187.
Morgan Iron Works (New York City), 508.
Morris County (N. J.), 497, 499, 512.
Morris Foundry (Philadelphia), 515.
Morristown (N. J.), 222.
Mott, Jordan L. (stovemaker), 503.
Mount Tom (Mass.), 178.
Mt. Pleasant (Ohio), 575.
Mt. Pleasant (Tenn.), 542.
Mt. Savage Iron Works (Md.), 512.
Mt. Vernon (Va.), 477.
Mulberry Tree, 197.
Mule Spinning, 262, 427–428.
Muscovy Company (England), 4.
Muslins, 345.

Nahant (Mass.), 78.
Nails and Nail-making, 114–115; cut nails, 222; duties, 1789, p. 291; household, 161, 441; Lexington, 341; localization, 516; Massachusetts, 204; Mercersburg, 339; Pittsburgh, 339, 340, 515–516; Washington, 339; wire nails, 518.
Nantucket (Mass.), sheep, 78; silk manufactures, 575; wool, 23.
Nashua (N. H.), 550.
Nashville (Tenn.), cotton mill, 537; Kentucky cordage and linen, 343; silk mill, 575.
Natchez (Miss.), 342.
Natural Resources, 8.
Naugatuck Valley (Conn.), brass, 517, 525, 526; clocks, 517; railroad built by manufacturers, 353.
Naumkeag Cotton Mills (Salem), 559.
Naval Stores (see *Pitch, Tar, Turpentine*), British encouragement, 24; British imports, 96; island market, 99; North Carolina, 317; prices, 137–138; reason for colonizing America, 9.
Navigation Acts, 12, 13, 32, 322; after 1815, pp. 257–258, effects, 18–19, 36; history, 16–17.
Negroes, brewery, 167; coal miners, 331; consume few manufactures, 105; household artisans, 195; influence immigration, 553; iron workers, 399; Kentucky, 341; race line in occupations, 23, 155; and footnote 2; Salem 399; textile hands, 191, 399, 440, 554, 555; tobacco hands, 486.
Neponset Woolen Manufacturing Company (Mass.), 570.
New Albany (Ind.), 542.
New Amsterdam, Freedoms and Exemptions, 15; monopolies, 47; occupied by English, 2; petition repeal of duties, 57; population, 102; toll law, 63; trade with English colonies, 113.
Newark (N. J.), vehicles, 475; jewelry, 528.
New Bedford (Mass.), 469.
New Brunswick (N. J.), 116, 166.

Newcastle (Del.), 520.
New Ebeneezer (Ga.), 187.
New England (see *Mass.*, *R. I.*, *Conn.*, etc.), agricultural implements, 477; buttons, 524; capital invested in western and southern manufactures, 368; cloth printing, 548–549; colonial cotton imports, 83; cotton looms and spindles, 543, 553, 558; cotton manufactures, 535–536; cotton mill labor, 540; cotton mills, size, 452, 453; crises, 131, 132; deserted farms and mill sites, 392–393; duck factories, 530, 531; early free commerce, 56, 145; export trade, 98, 205; hardware, 524; hats, 204; homespun, 438–439; implements, 475; iron furnaces and forges, 204; iron trade, 96; laws, toll, 63; linens, 440; manufactures in Massachusetts, 200–201; manufacturing advantages, 464; maple sugar, 489; mills in 1809, p. 536; New England Society for Encouraging Manufactures, 358; organization of cotton manufactures, 539; population, 102, note 2; puddling, 511; rolling mills, 512, 513; ship-building, New Hampshire, 200; silver plating, 527; steel, 517; tannery, 167; textile mill profits, 375-376, 377; tools and cutlery, 204, 523; township organization, 40–41; wages, 156, 395; wool, 321.
New England Company (Rockville, Conn.), 377.
New England Worsted Company (Lowell-Framingham), 573.
New Hampshire, Arkwright mill, 536; corporation abuses, 460; hemp, 39; iron, 40, 54, 154, 497; iron cost, 395; iron furnace, profits, 377; iron-makers petition for duty 296; laws, export, 54; laws, legal tender, 45; laws, subsidy, 39; laws, tariff, 61; laws, tax exemption, 46; linen, 203, 207; lumber exports, 94; manufactures in 1721, p. 200; manufactures in 1733, p. 203; manufactures in 1768, p. 207; population, 102; sawmills, 176; spindle increase, 544, 558; tariff war with Massachusetts, 59; wages, 393, 396; woolen manufactures, 203, 561, 567.
New Haven (Conn.), 466; Arkwright mill, 535; axes, 514; buttons, 524; carpets, 568; iron-works, 45, 69, 92; shoe exports, 116; vehicles, 475, 476, 517.
New Haven County (Conn.), 523, 526.
New Ipswich (N. H.), Arkwright mill, 535; lace, 441; looms, 429; skilled spinners, 539; water power case, 406.
New Jersey (East Jersey and West Jersey), bog ore smelting, 496; copperas, 315; cotton, 84; cotton manufactures, 543; Delaware ore, 496; duties, 56; flour mills, 178–179; glass, 203, 209, 211; iron, 45, 498, 500, 501; iron castings, 504; iron costs, 385; iron-makers petition for duty, 296; iron-works, 209; laws, bounty, 33; laws, child labor, 264; laws, corporation, 266, 267; laws, export, 54, 56; laws, tax, 45, 46, 47; laws, toll, 63; linen, 116, 197; lumber, 56; mill sites reclaimed, 181; Paterson power company incorporated, 404; pottery exports, 99; print works, 267; rolling-mills, 511, 512, 514; sawmills, 177; silk manufactures, 577; slitting mill, 209; starch, 486; steel, 209, 221, 516, 517; stove plates, 502; township organization, 40–41; vehicles, 476; weaving costs, 388; woolen manufactures, 197, 216, 226, 567; zinc, 328.
New Lebanon (N. Y.), 187.
New London (Conn.), 300, 525.
New London County (Conn.), 538.
New Netherlands, 56.
New Orleans (La.), cigar-making, 487; cotton-seed oil, 493; cotton yarns, 543; flour imports, 113; freights, 337; gas, 494; steam cotton mill, 557; sugar refining, 491.
New York City (See *New Amsterdam*), anthracite smelting, 412; Arkwright machinery, 535; board, 136; Bolting Act, 52; brass-founding, 502; brick, 166; buys Carolina yarn, 541; canning, 485; capital, 145, 148, 465, note; coal, 332; coopers, 60; copper, 525; cotton manufactures, 192; cotton mill, 534; distilling prohibited, 68-69; Dutch traders, 113; engine works, 506, 507; flax manufactures, 190; flaxseed exports, 82; flour trade, 113; furniture, 472, 474; gas, 494; glass, 209; hardware, 525; hats, 209; homespun, 199; iron steam-boats, 469; jewelry, 527, 528; lime burning prohibited, 68–69; linen factory, 208, 217; linen mill, 531; looms, 430, 550; merchants' profits, 148; mule spinning, 427; New York Manufacturing Society, 192; oyster pickling, 485; per cent of State's manufactures in, 465; population, 104; sale of domestic manufactures, 359; silk manufactures, 577; Society of Arts, 190, 218; steam-engine, 408; sewing-machines, 521; ship-building, 470; stoves, 502, 503; sugar, Georgia, 489; sugar refiners petition, 304; sugar refining, 52, 205, 218, 304, 394, 491; tanning, 209; textile machinery, 518, 519, note 3; tile-kiln, 166; wire, 518; wire nails, 518; workhouse manufactures, 188.
New York Convention, furniture, 473; iron, 500; wages, 396; woolens, 567.
New York Manufacturing Company (New York City) (1) 192, 448, 535; (2) 519, note 3.
New York State, agricultural machinery, 478; air furnace, 171; Arkwright mill, 536; artisans, 198; brass-founding, 526; brewing, 59, 481; canning, 485; capital, 152; capitalization authorized, 266, 267; carding machines, 519; cotton imports, 83; cotton looms and spindles, 543; cotton mills, 549; crisis, 131; distilling, 205, 480; duties, 58, 59, 60; freights, 88; furniture, 474; hats, 23; homespun, 439; Indian trade taxed, 58; iron, 171, 500, 501; iron costs, 386; iron furnace profits, 377–378; laws, bounty, 33; laws, corporation, 265, 266, 268; laws, export, 54; laws, inspection, 65; laws, monopoly, 51, 52; laws, patent, 49; laws, tariff, 56–57, 61, 116; laws, tonnage, 60; linen mill, 531; lumber, 467, 468; manufactures, 198, 199, 201, 205, 206; maple sugar, 489; nails, 516; Palatines, 42; potash, 166; power knitting, 559; profits, 88, 375, 377; puddling, 512; rolling mills, 512; salt, 315; sawmills, 26, 176, 177; sewing-machines, 522; ship-building, 98, 470;

spindle increase, 544; stoves, 504; steel, 221, 516, 517; tar, 199, 201; vehicles, 476; wages, 156; war, 133; woolen machinery, 569; woolen manufactures, 198-199, 208-209, 563, 566, 574; woolen mills and sets of machinery, 567; woolens, homespun, 566.
Newark (N. J.), 466; iron ore, 91; jewelry, 527; shoe center, 116; vehicles, 475.
Newbury (Mass.), land grant, 41, 42; sheep, 78; veneer mill, 473.
Newburyport (Mass.), capital in woolen manufactures, 561; cigar making, 488; steam cotton mills, 411, 559.
Newcastle (Del.), 519.
Newport (R. I.), cotton factory, 534; distilling, 480; population, 104; sperm trust, 184; wool market, 78.
Newport News (Va.), 84
Newton, Sir Isaac, 583.
Non-importation, 215-216, 218, 585.
Non-intercourse, 234, 238, 272, 273.
Norfolk Cotton Factory (Mass.), 456.
Norris Locomotive Works (Philadelphia), 362-363, 508, 509.
North Adams (Mass.), 549.
North Andover (Mass.), 446, 564.
North Carolina, cotton mills, 459, 537, 552; duties, 55; homespun, 209; iron, 497, 499; iron-works, 219; laws, bounty, 33, 36; laws, export, 54; laws, inspection, 65; laws, land grants, 40; laws, lottery, 44; laws, premium, 38; laws, tax, 45; lumber, 209-210; lumber trade, 95; naval stores, 317; potash, 36, 38; profits, cotton mill, 375; report on manufactures, 555; resolution against tariff, 280; sawmills, 95; sends produce to Virginia, 107; ships yarn to New York, 541; spinners' convention, 555; trade in hands of New Englanders, 113.
North Providence (R. I.), 541.
Northampton (Mass.), cutlery, 523; freight, 90; silk, 575, 576; woolen mill, 563, 565.
Northbridge (Mass.), 477, 520.
North, Simeon (arms manufacturer), 420, 517.
Norton (Mass.), 441.
Norway, 252.
Norwich (Conn.), 534, 544.
Nova Scotia, 331.
Novelty Iron Works (New York City), 506, 507.

Ogdensburg (N. Y.), 467.
Ohio, agricultural machinery, 478–479; bog ore furnaces, 497; carpets, 569; coal smelting, 413, 499; cotton mill profits, 375; cotton mills, 542; distilling, 318, 480; flour, 318; furniture, 474; iron, 498, 499, 501; iron costs, 385; iron smelting, 412; iron works, 347-348; packing, 484; profits, 376, 377; rolling mills, 515; salt, 345; sewing-machines, 522; sugar, 489; vehicles, 476; woolen manufactures, 563, 567, 574; woolen mill, 432.
Ohio River, navigation, 339; steamboats, 340, 469, 471; trade in local manufactures, 344.
Ohio Valley, cotton manufactures, 320; cotton mills, 542, 552; cotton spindles, 558; distilling, 318; French settlers, 341; iron manufactures, 329; iron product, 499; linen mills, 531; manufacturing center, 464; settlement, 28, 107; ship-building, 470.
Oils, "American olive," 358; castor, 493; corn, 493; cotton-seed, 493; England, 5; lard, 483, 493; linseed, 51, 205; mineral, 493-494; sperm, 184, 327, 493; whale, 97, 199, 327, 493, 494.
Olneyville (R. I.), 410.
Oneida County (N. Y.), 537, 538, 541, 552.
Orange County (N. Y.), 497, 499.
Oregon, 468, 574.
Organization (see *Companies, Corporations, Trusts*), affected by crises, 380; affected by patented inventions, 519–521; centralization, 543-544; combined processes, 371, 451; community of interest, 457; cotton manufactures, 539, 551; early commercial and industrial in England, 4, 5; factory, 448-455; family control, 458; homespun, 438-440; household, 440-445; mill and furnace, 445-448; packing industry, 483; stages, 442-443; trusts, industrial in colonies, 181–182; woolen manufactures, 357, 449, 453, 574.
Otsego County (N. Y.), 538.

Pacific Mills (Lawrence), 453, 463.
Packing Industry, associated industries, 466; general account, 481-485; geography, 318; inspection, colonial, 65, 77, 99; household, 161, 163; waste products, 483-484.
Painesville (Ohio), 348.
Palatines, 42.
Paper, Connecticut, 208; crisis, 381; duty, 271; England, 5; Falmouth, 204; free rags, 288; hangings, 217; intercolonial trade, 116; introduced by Dutch, 154; Kentucky, 340; Massachusetts, 51, 204; mill described, 168; monopoly, 51; New York, 209; Ohio Valley, 345; Philadelphia, 116, 165, 231; Rhode Island, 208; wages, 394.
Paraffin, 492.
Parker, Edwin (linen manufacturer), 191.
Pastorius, Francis Daniel, 197.
Patents, colonial, 47–53; early English, 5, 47; first in America, 48; influence on factory organization, 475, 520, 521; laws, 312–313, 314; number issued, 313.
Paterson (N. J.), cotton duck, 549; cotton manufactures, 535, 536, 552; duck factory, 531; flax manufactures, 325; locomotives, 508, 509; looms, hand, 550; machine-shops, 434, 466; mills, 402; operative class, 540; organization of cotton manufactures, 551, 552; power development, 404, 448; power transmission, 411; print works, 549; silk manufactures, 575, 576; textile machinery, 520; tools, 523; yarns sold in Philadelphia, 538, 549.
Patroons, 48.
Pawtucket (R. I.), carding machines, 423; cloth printing, 547; Slater, 535; textile machinery, 519, 520.
Pawtucket Cotton Manufacturing Company (R. I.), 373–374.
Pawtuxet Valley (R. I.), 536.

Peacedale (R. I.), power spinning, 565; wages, 395; weaving rates, 389; woolen manufactures, 357, 561.
Pearl Ash, see *Potash*.
Peddlers, 69, 117, 523–524.
Pembroke (Me.), 513.
Pendleton District (S. C.), 542.
Penn, John (Governor), 190, 209.
Penn, William, 23, 37, 173.
Penn Iron Works (Philadelphia), 508.
Pennsylvania, apprentices, 68; artisans attainted of treason, 164; blankets, 568; brass founding, 526; brewing, 481; capital, 146, 150; cigar-making, 488; coal, 331; coal smelting, 412–413; cotton manufactures, 379–380, 544, 549, 552; crisis, 131; currency, 127–128, 584; distilling, 480; duties, 55, 58, 59, 61, 62; exports, flaxseed, 82; exports, lumber, 95; firearms, 221; flannel, 569–570; Frame of Government, 67; freights, 88; furniture, 474; glass, 209; hemp, 33–34, 82; imports, flax, 116; imports, ratio to population, 119–120; imports, wool, 23, 79; industrial training, 67; iron, 76; iron costs, 385, 386; iron-furnaces, 329, 497, 499, 500, 501; iron industry, depression, 373; iron-makers ask protection, 296; iron trade, colonial, 96–97; laws, bounty, 33–34, 37; laws, corporation, 265, 267; laws, export, 54; laws, inspection, 26, 64–65; laws, legal tender, 44–45; laws, patent, 49; law prohibiting export of machinery, 533, note 4; laws, subsidy, 43; laws, tariff, 61, 62; laws, tax, 69; leather, 55; linen, 59, 197, 209, 212; liquor not sold near iron works, 69; lumber, 467, 468; mahogany mills, 316; manufacturing reports upon, 201, 205, 206, 209; mule spinning, 427; nails, 516; paper, 165, 168; powder mills, 222; profits, farming, 88; profits, iron-furnace, 377; profits, woolen mills, 376; puddling, 511; rolling mills, 510, 511, 512, 513, 514, 515; sawmills, 176; settlement, 2; settlers, skilled, 154; sewing-machines, 522; sheep, 78; ship-building, 209, 470; silk, 43, 201, 575; snuff mills, 487; steam used in manufacturing, 409; steel, 516, 517; stoves, 115, 502, 503; supplied South during Confederation, 230; textile machinery, 521, 533, note 4; tobacco, 487–488; trade instruction, 67; vehicles, 476; wages, 156, 393–394; wire, 518; wool, quality, 80; woolen manufactures, 197, 563, 567, 568, 574; woolen mills, 567; yarn market, 447; yarn mills, 439, 447.
Pennsylvania Society for Promoting Industrial Improvements, 411.
Pernambuco Cotton, 319.
Peru, 125, 362.
Peru Iron Works (Clintonville, N. Y.), 378, 512.
Petersburg (Va.), cotton mills, 538, 551, 558; cottonseed oil, 493; flour mills, 179, 317; mill town, 107; profits, cotton mill, 375.
Petitions, against auction system, 242; Baltimore for higher duties, 390; Baltimore sugar refiners, 304; Boston merchants for free trade in 1655, 57; "Boston Tradesmen and Manufacturers" for a protective tariff, 62; British hatters, 22, 162, 204, 205; Connecticut wire-makers, 296–297; London and Bristol iron workers, 24; London merchants regarding woolens, 22; Massachusetts for remission of taxes, 132; Massachusetts hatters for craft society, 66; Massachusetts iron-founders, 296; New Amsterdam for repeal of duties, 57; New Jersey and New Hampshire furnacemen, 296; New York sugar refiners, 304; Pennsylvania iron-masters, 296; southern in favor of cotton manufactures, 554; tanners, 317; Virginia regarding manufactures, 197, 554, 555; Worcester scythe and saw makers, 297.
Petroleum, see *Oils, Mineral*.
Philadelphia, artisans, 162, 164, 195; blankets, 568; boiler-plates, 513; board, cost of, 136; brewing, 231, 481; broadcloth, 216; burning fluid, 493; capital in iron works, 146; capital in western manufactories, 368; cards, hand, 231; cards, power, 43, 519; carpets, 568, 569; car-wheels, 505; cigar-making, 488; clocks, 231; cloth-printing, 43, 547–548; coal used, 332; corporations, opposition to, 280–281; correlation of industries, 466; cotton gins, 478; cotton manufactures, 43, 84, 549, 551, 559; cotton mills, 534, 535, 537, 538; cotton weaving, hand-loom, 539, 549, 559; crisis prostrates manufactures, 379; cutlery, 523; distributing point, 120; duck factory, 531; electroplating, 527; engine works, 507; exhibits of manufactures, 217; exports, flaxseed, 82; fair, 127; fire regulation, 68; founding, 2; freights, 90; Friends of American Manufactures, 231; furniture, 231, 472, 473, 474; gas, 494; imitations of foreign fabrics, 550; imports linen, iron, and red lead from the West, 344–345; iron costs, 386; iron duties opposed, 297; iron, galvanized, 513; iron prices, 138; jennies, 190, 223, 424, 425; jewelry, 528; lighting fixtures, 527; linen, 188, 217, 531; linen mills, 531; locomotive works, 508, 509; looms, 430; machine-shops, 434, 466, 506; market, flour, 180; market for New England linen, 116, 440; market, monthly, 359; market, paper, 116; market, shoe, 116, 345; operatives, 449, 540; paper, 116, 165; per cent of State's manufactures in, 465, and note; population, 104, 379; rolling mills, 513; saws, 177, 522; ship-building, 95, 469, 470; silk manufacturers, 575, 576, 577; starch, 113, 231; steam-engines, 408, 409; steel, 221; stoves, 502, 503; textile center, 465; textile machinery, 518, 519, 520, 533; sugar machinery, 115; sugar refining, 231, 394, 491; timber exhaustion, 75; tinware, 524; tools, 523; type, 231; United Company for Promoting American Manufactures, 183, 190–191; vehicles, 231, 475; wages, shoemakers, 395; wages, sugar refiners, 394; wages, weavers, 395–396; wool manufacturing center, 574; woolen hand looms, 569, 574; woolen manufacturers, 183, 188, 191, 225–226, 231, 562, 567, 568, 574; woolen mills, 562; workhouse manufactures, 188; worsteds, 187, 573.
Philippines, 305.
Philosophical Society, 43.

Phœnixville (Pa.), 515
Piedmont (Italy), 10.
Piedmont District (Southern States), 464.
Pilot Knob (Mo.), 498.
Piscataqua River (Me.), 94, 546.
Pitch, 11, 51, 137.
Pittsburgh, boots and shoes, 345; brick, 107; car-wheels, 505; cotton factory, 339–340; cotton mills, 537, 538, 542, 552; cotton spindles, 558; crisis prostrates manufactures, 379–380; cutlery, 523; engine works, 409, 505, 507; freights, 337, 349; Gazette, 339; glass works, 339, 344; hardware, 525; immigrant artisans, 273; industries, 107, 339–340; iron castings, 506; iron manufactures, 344; iron steamboats, 469; linen mill, 531; lumber, 107; manufactures little affected by iron duties, 297; market, cotton, 543; mechanics, nationality, 400; Mechanics' Society, 340; Mexican buyers, 361; nails, 339, 340, 516; plows, 477; population, 466; pottery, 340; prices, cigar, 487; puddling, 511; rolling mills, 511–512, 513; steamboat building, 471; steam-engines, 409, 410; steel, 415, 517; stoves, 503; tools, 523; wages, iron-workers, 394; wages, shoemakers, 395; weaving, 542; wire, 518; wire works, 409; woolen mills, 409, 563.
Pittsfield (Mass.), 519, 562.
Plaisted, Joseph (potash maker), 43.
Plaisted, Thomas, 40.
Plows (see *Agricultural Implements*), 209, 231, 476, 477, 478.
Plymouth Colony, 40; duties, 55; laws, export, 53; laws, mill, 64; lumber exports, 94; tar monopoly, 137; timber conservation, 75.
Plymouth Company, 4.
Plymouth County (Mass.), 510, 516.
Poland, 11, 325.
Pomfret Company (Conn.), 374.
Population, Cincinnati, 465; Connecticut, 3; density, 103–104; dispersion in South, 104–105; growth of colonial, 102–103; growth stimulated by railways, 352; Maryland, 105; Massachusetts, 102; Philadelphia, 379; Pittsburgh, 466; proportion engaged in manufacturing, 580; urban in colonies, 104.
Porcelain, see *Pottery*.
Port Richmond Iron Works (Philadelphia), 507–508.
Portland (Me.), 485, 508.
Portsmouth (N. H.), 411, 534, 559.
Portsmouth (Ohio), 350.
Portsmouth (R. I.), 41.
Portugal, 87, 94, 154, 204.
Potash and Pearl Ash, bounties, 36; Connecticut, 166, 208; exports, colonial 95, 317; inspection, 65; land grant, 40; monopolies, 51; premiums, 38; process of manufacture, 165–166; public loan, 43; Rhode Island, 208; Virginia, 11.
Potomac River, 337, 338–339.
Potomac Valley, 499.
Pottery and Porcelain, bounty, 36; consumption, colonial, 111–112, 231; duty on, 271, 275; England, 5; intercolonial trade, 115; New Jersey exports to West Indies, 99; Pittsburgh, 340; South Carolina, 154; Virginia, 205.
Poughkeepsie (N. Y.), satinets, 564; silk mill, 575; woolen mills, 562, 563.
Poughkeepsie Clock Manufacturing Company (N. Y.), 268.
Powell, John (clock-maker), 35, 39, 43.
Power, see *Steam-Engines, Transmission, Water-power, Windmills*.
Pratt Iron Works (Buffalo), 514.
Prattville (Ala.), 478.
Premiums on Manufactures, British on masts, 94; defined, 33; laws, 37–38.
Preston (Conn.), 522.
Prices, agreements, 458; American cottons in Calcutta, 362; American prints, 345; board, 136; bristles, 340; British manufactures in New York, 238; broadcloths, 563; changes and crises, 382–383, 384–385; cigars, 487; clocks, 387; clothing, 142; combination favorable to manufactures, 123; Connecticut cloth, 225; cotton, 84, 142, 337, 386–387, 550, 553; cotton goods, 141, cotton shirting, 386–387, 388; decline after 1816, p. 275; difficulties of estimating, 135; East Indian goods in New York, 238; fall at close of War of 1812, p. 345; flax, 142; flour, 139, 336–337, French silks in New York, 238; Germantown stockings, 206; groceries, 135–136; hats, 142; hose, 142–143; influence of technical progress upon, 385; iron, 138–139, 385–386; iron, comparative, United States and Sweden, 300; iron, 138–139, 300, 385–386; leather, 142; linen, 141; linen, New Hampshire, 207; lumber, colonial, 136–137; manufacturing company stocks, 373; maple sugar, 489; negro cloth, 294; pitch, 137; raw materials, 143; rise, after 1790, p. 237; rise at Boston, 197; rum, 139–140; Salem, 135–136; ship-building, 138; ships, 138; shoes, 142; spinning, 387–388; steamboat, 344; steel, 139; tar, 137; tariff influence, 279, 286–287; tobacco, 19, 84; turpentine, 138; variation in colonial price level, 143; Virginia cloth, 149; weaving, 388–389; weaving in Virginia, 388; wheat, 139, 143; whisky, 487; wool, 80, 141–142, 292–293; wool, decline in England, 250; woolen yarns, 141–142; woolens, 100, note 5, 140–142, 225, 294; worsted yarns, 141, 142, 572–573.
Principio Iron Company (Md.), 91, 92, 146–147, 173–174, 182, 459.
Printing and Publishing, regulated in colonies, 69; steam used, 409; value of product, 582.
Printing, Cloth, American imports, 259; Baltimore, 548; British excise, 259; Gloucester Print Works, 267, 559; history of, in United States, 547–549; Lowell, 546, 548; imports, 259; machinery, 431; Philadelphia, 43, 547–548; prevented overstock of plain goods, 431–432; price, 345; Providence, 548; Rhode Island, 547, 548; sales at New York, 359; silk, 547; tariff, 547, 553; woolens, 432; worsteds, 573.
Prison Manufactures, 379.
Privy Council, 12, 13.
Profits, agricultural, 88, 151, 367; American Print Works, 373; Boston Sailcloth Company, 373; carrying trade during Napoleonic Wars, 237; Congress of Deputies' resolution,

148; Connecticut linen manufacture, 373; cotton mills, 309, 373–376, 553; cotton-planting, 368; definition, 375; Fall River Iron Works, 373; farming in New York and Pennsylvania, 88; iron-making, 377–378; Lowell manufacturing companies, 374–375; manufacturing and mercantile, 147, 372; manufacturing, estimate of average, 378; manufacturing, high, 370; manufacturing, in Massachusetts, 369; merchants', in colonies, 147-148; New England textile mills, 375–376, 377; reinvested, 367; southern textile mills, 375; United Company of Philadelphia, 183; wages included, 372; woolen manufactures, 376-377.
Providence (R. I.), 466; Arkwright mills near, 535, 536, 538; auction of domestic manufactures, 359; calico-printing, 548; capital in southern cotton mills, 541; capital in textile mills, 458; capital invested in manufactures, 368; Cloth Hall, 359; cotton exports, 550; cotton factory, 534; cotton goods, 549; engine works, 506; files, 523; gas lighting, 494; hardware, 525; jewelry, 528; machine-shops, 434, 466, 521; manufactures, 357; mules manufactured, 428; mule spun warp, 427; population, 104; rolling mills, 510; silk mill, 575; silverware, 527; steam cotton mills, 411; steam woolen mills, 409; stoves, 503; textile machinery, 520; West Indian trade, 357.
Providence County (R. I.), 552.
Provisions (see *Packing*), 97, 99, 114.
Prussia, 520.
Prussiate of Potash, 484.
Puddlers' Wages, 393.
Puddling, see *Iron*.
Pugh, John T. (toolmaker), 523.

Quarry, Colonel Robert, 14, 131.
Quequechan Mill (Fall River), 407.
Quincy (Mass.), 153.

Racine (Wis.), 478.
Railroads, absorb capital, 382; affect growth of population, 352; affect western trade routes, 352; building, 235, 285; carriers of raw materials, 353; decrease freights, 338; influence on manufactures, 351; promoted by manufacturers, 352-353.
Raleigh (N. C.), 555.
Randolph, Edward, 14, 196.
Rapp, George, 563.
Rathbone, Joel (stovemaker), 503.
Raw Materials (see also *Tariff*), a reason for colonizing America, 10; duties, 58–59, 271, 287–305; effect of machinery, 433–434; free list, 60; price changes and manufacturing crises, 382-383; prices, colonial, 143; transportation difficult, 91–92; Walker tariff, 288.
Reading (Mass.), 41.
Reading (Pa.), 507, 514.
Reading Railroad, 353.
Reheboth (Mass.), 535.
Rellieux, N. (inventor), 490.
Rensselaer County (N. Y.), 478, 552.
Rensselaer Iron Works (Troy), 514.
Revere Copper Company (Boston), 296, 502.
Revolution, American, firearms, 32, 221–222; influence in New England, 225; influence on manufactures summarized, 226-227; inland settlement, 89, 224; iron and steel, 219-221; powder, 222; salt, 32, 222–223; saltpeter, 32; southern industry, 226; textiles, 223, 225.
Revolution of 1688 (England), 2, 11, 13.
Rhode Island, candle wick, 387; cloth-printing, 547, 548; coal, 332; cotton-jennies, 425; cotton mills, 452, 461, 536; depression caused by paper money, 128; duck, 39, 42-43; duty on sugar, 60; interest rates, 150; iron, 44, 205, 208; iron ore imports, 496; jewelry, 99, 527, 528; labor, foreign, 398; laws, bounty, 35, 36; laws, corporation, 266; laws, legal-tender, 45, 126; laws, lottery, 44; laws, monopoly, 50, 51; laws, subsidy, 39; laws, tariff, 60, 61; laws, tax, 46; looms, power, 428-429, 565; manufactures, 204-205, 208, 231; mills, 551; mule-spinning, 427; negro cloth, 568, 570, 571; paper, 208; potash, 208; price agreements, 458; *id.*, wool, 80; profits, agricultural, 151; provisions, 114; rents, 150, 151; saltpeter works encouraged, 32; sheep, 78; silk mill, 332; soap, 50, 154; spermaceti, 208; spindle increase, 544; spinning rates, 387; steam mills, 559; steel, 221, 516; textile machinery, 520, 567; weaving rates, 389; wool, 80; woolen manufactures, 208, note, 567, 568, 569; worsteds, 208, note, 573; yarn market, 447.
Richmond (Va.), Convention of Southern Manufacturers, 555; cotton mills, 538, 552, 558; flour exports, 360–361; flour port, 336; iron-rolling, 514; mill town, 107, 317; puddling, 514; tobacco factory, 486.
Richmond Iron Works (Richmond), 514.
Rifles (see Firearms), 221.
Ringwood Iron Works (N. J.), 126.
Roads, 89.
Robeson, Andrew (calico printer), 548.
Robeson and Son (Fall River), 407.
Rochester (N. Y.), 466, car-wheels, 505; flour mills, 317; steam-engines, 509.
Rock see *Distaff*.
Rock Manufacturing Company (Conn.), 376-377.
Roebling, John, 518.
Rogers Locomotive Works (Paterson), 508.
Rolling Mills, see *Iron and Steel*.
Rosin, 344.
Rowland, William, 522.
Rowley (Mass.), 40, 93, 153.
Roxbury (Mass.), 41.
Rum (see *Distilling*), consumption, 480; duties, 302; exports, 97, 303; intercolonial trade, 114; prices, 139–140.
Rumsey, James (inventor), 49.
Rupp, Adam (stocking-maker), 189.
Russia, American locomotives, 362–363; bristles, 327; iron, 139, 252, 298; railway shops, 508; tallow, 327, 492; wages, 299–300.
Rutland (Vt.), 41.
Rutland County (Vt.), 497.
Ryle, John (silk manufacturer), 576.

Saco (Me.), 376, 547, 551.
Saddlery, 116.
Saginaw (Mich.), 467.
Sailcloth, see *Duck*.
St. Anthony Falls (Minn.), 467-478.
St. Clair County (Mich.), 494.
St. Johnsbury (Vt.), 518.
St. Louis (Mo.), candles, 344; castor oil, 493; cotton mill, 558; cotton yarn for Lexington, 346; furniture, 474; iron-rolling, 514; lead, 330; locomotives, 509; lumber, 468; packing, 484; red lead, 344; ship-building, 470; shot, 344; soap, 344; stoves, 503; sugar refining, 491; tobacco factories, 486-487.
St. Mary's (Md.), 105.
St. Thomas, 257.
Salem (Mass.), apprentices, 67; capital invested in manufactures, 368; cigar-making, 488; cotton mills, 411, 559; duck factory, 530; furniture, 473; glass, 41, 42, 152, 169; homespun, 563; land grant, 41; loans, 42; lumber trade, 94; manufactures, 368; negro labor, 399; prices, 135-136.
Salem (N. C.), 89 187.
Salem (N. J.), 84.
Salem County (N. J.), 209.
Salisbury (Conn.), 497.
Salisbury Woolen Manufacturing Company (Mass.), 570.
Salmon Falls Woolen Company (N. H.), 566.
Salmon River (N. H.), 546, 566.
Salt, bounties, 36; duties, 271, 279; England, 5; land grants, 40, 41; monopolies, 50; New York, 315; premiums, 38; Revolutionary manufactures, 222-223; subsidy, 39; Virginia, 32, 315.
Saltpeter, bounties, 36; England, 5; imports, 333; Kentucky, 315, 333; Missouri, 333; Ohio, 345; on free list, 288; premiums, 38; Rhode Island, 32.
San Antonio (Texas), 574.
Sanford (Me.), 549.
Santa Fe (New Mexico), 361.
Satinets, see *Woolen Manufactures*.
Saugus (Mass.), 488.
Savannah (Ga.), 468.
Savannah River (Ga.), 469, 558.
Saws (see *Tools*), 177, 421, 522.
Scales, 518.
Scarborough, Colonel Edmond (saltmaker), 39.
Schaghticoke (N. Y.), 531.
Schenectady (N. Y.), 394.
Schenk, Michael (cotton spinner), 538.
Scholfield, Arthur, 261, 446, 519, 561, 562.
Scholfield, John, 261, 446, 561.
Schuylkill Valley (Pa.), 497, 499.
Scituate (Mass.), 216.
Scotland, colonial trade forbidden, 14, 17; flax machine, 50; hot blast discovered, 413; power-loom, 429; wages, 157; wool, 81.
Scranton (Pa.), 514.
Scythes, 48, 339, 345.
Serge, see *Worsteds*.
Sewing Machines, 416, 521-522.
Seymour (Conn.), 576.
Shakers, 187, 502.
Shaw, Abraham, 40.
Sheep, see *Wool*.
Sheffield, Lord, 255.
Shelburne Falls (Mass.), 523.
Shenandoah Furnace (Va.), 487.
Shenandoah Valley (Va.), 317.
Shilling, see *Currency*.
Ship-building, affected by embargo and non-intercourse, 273; bounties, 36, 470; British capital, 147; encouraged by Navigation acts, 18; English market, 95; growth and location, 468-472; immigrant labor, 153; increase during Napoleonic Wars, 238; influence of paper money, 128; inland construction, 91; inspection, 66; iron, 469; island market, 98; Massachusetts, 153, 204, 206, 208, 470; on western rivers, 340; prices, 138; steamboats, 471; tax laws, 45; timber used, 468-469; Virginia, 95; volume, 471-472.
Shipwrights, 11, 153.
Shirley (Mass.), 502.
Shops, 163.
Shot Towers, 341, 344.
Shuttle, see *Looms*.
Silk, 318; bounties, 34, 36; domestic product, 25, 318, 326; duties, 289–290; England, 5; Georgia, 10, 154; history of manufacture, 575-577; imports, 251-252, 326-327; manufactures used in colonies, 110; mills, 332; Pennsylvania, 43, 201, 575; power-loom, 430; printed, 547; South Carolina, 42, 198, 210.
Silver (see *Currency, Specie*), 99, 125, 286.
Silverware (see *Jewelry*), 99, 527.
Simsbury (Conn. , 203.
Singer Sewing Machine Company (New York City), 521.
Singletary River (Mass.), 404, note 2.
Slater, John, 561.
Slater, Samuel, 191, 192, 261, 357; advocated roads and railways, 352–353; belt transmission, 420; cotton duties, 309; early life in America, 535; employs children, 397; family control of industry, 458; Pawtucket mill runs through crisis of 1819-1820, 379; profits, 372; shipped goods overland, 336; wealth, 374.
Slaterville (R. I.), 546.
Slaves, Slavery (see *Negroes*) African slave trade, 99; clothing, 105; employed in Southern spinning mills, 399, 555; influence on manufactures, 553-554; plantation craftsmen, 92; plantation manufactures, 440.
Slitting Mills (see *Iron* and *Steel*).
Smith, Adam, 156, 157.
Smith, Captain John, 10, 84.
Smyrna, 83, 566.
Snuff, see *Tobacco*.
Soap, Boston, 482; castile, 50, 154; Cincinnati, 484; duties, 1789, p. 271; England, 5; exports, 97; Germantown, 206; intercolonial trade, 114; St. Louis manufactory, 344; West Indies market, 99.
Society Hill (S. C.), 542.
Somerset County (Md.), 131, 201.
Somersworth (N. H.), 545, 546, 568.
South Carolina, blankets, 568; capital, 146; cotton, 84; cotton manufactures, 198; cotton mills, 425, 459, 533, 537, 552, 556-557; crisis closes cotton mills, 541; crisis due to war, 133; duties, 55, 58, 60, 61; hemp, 25;

imports, cloth, 210; indigo, 333; iron, 497; iron works, 21–220, 497, 514; laws, bounty, 33, 34, 35, 36; laws, monopoly, 50, 51; laws, patent, 48–49; laws, premium, 38; laws, tariff, 56, 58, 60, 61; laws, tax, 46; laws, tonnage, 60; laws, town, 68; loom houses destroyed, 226; manufactures, 198, 205, 210; mullification, 280; potash, 36, 38; pottery, 154; sheep, 78; ship-building, 36; silk, 42, 198, 210; sugar, 489; tar kilns, 165; wages, 396; woolen manufactures, 191, 568.
South Manchester (Conn.), 576.
Southbridge (Mass.), 453, 565.
Southwark Iron Works (Philadelphia), 508.
Spain, currency, 583; flour market, 87; imports colonial hats, 23, 204; iron, 138; lead, 330; lumber market, 94; market for English woolens declines, 11; opens West Indian market, 360; wool, 77, 81, 100, 250, 321, 324.
Spanish America, 360–361.
Spartanburg County (S. C.), 514, 541.
Specie (see *Currency*), 237, 285–286.
Spermaceti Trust, 184.
Spindles, see *Machinery, Textile.*
Spinning (see *Cotton, Wool*, etc.), American and English system, 424; Arkwright machinery, 192, 425–427, 450; closes West Indian ports to colonial commerce, 131; costs, 387–388; craze, 200; distaff, 160; houses or schools, 67, 188, 189; jenny, 190, 191, 192, 223, 424–425, 534, 561, 565; mule, 262, 427–428; wages, 156–157, 395; wheel, 160.
Spottswood, Alexander (Governor), crisis in Virginia, 131; defeats Virginia tariff law, 58; iron works, 91, 92, 154, 173; manufactures in Virginia, 84, 198.
Sprague Family (R. I.), 458, 461.
Springfield (Mass.), duck factory, 530; early manufacturing center, 89; gunstock machine 421; metal manufactures, 222.
Springfield Company (Conn.), 376.
Stamford (Conn.), 32, 530.
Stamp Act, 25, 207, 210, 215.
Stanhope, Secretary, 198.
Starch, Boston, 482; corn, 486; general, 486; Germantown, 206; Philadelphia, 113, 231.
Stark Cotton Mills (Manchester), 550.
Stark County (Ohio), 479.
Statesburg (S. C.), 537, 538.
Steam Tonnage, 471, note 4.
Steam-Engines, Bolton and Watts, 409, 507; cost, 410; cost of steam and water per horsepower, 410–411; cotton mills, 411, 538, 542, 557, 558, 559; early construction, 408, 505; early use in manufactures, 403, 408–409; invention, 8; locomotives, 508–509; manufacture, 409, 505–509; mills, 507; number in use, 409; prohibited in Charleston, 556; rolling mills, 511; rotary, 410; standardization, 509; steamboats, 505, 507; steam-power cheaper in Great Britain, 410; steamships, 506, 507–508; sugar mills, 490; tubines, 410; types, 409; West and South, 410; woolen mills, 432, 562, 563.
Steamboats, 340, 344, 469, 471
Steel (see *Iron*), Connecticut, 208; duties, 297; German method, 221; localization, 516–517; patent, 50; Pennsylvania, 43; price, 139; process of manufacture, 171, 415; product, 516–517; Revolutionary manufactures, 221; Rhode Island, 209, 231.
Sterling Iron Works (N. Y.), 172, 175, 220, 477.
Steubenville (Ohio), 346; cotton mills, 542; engine works, 507; steam mills, 410; woolen mills, 563.
Stevens, Nathaniel (woolen manufacturer), 376, 388, 389.
Stiegel, Baron, 106, 147, 169, 209.
Stockholm, 299, 300.
Stoneware, see *Pottery.*
Stonington (Conn.), 561.
Stoughton (Mass.), 222.
Stourbridge, 92.
Stoves, see *Iron* and *Steel.*
Stratford (Conn.), 530.
Strouds, see *Woolen Manufactures.*
Subsidies to Manufacturers, 33, 39, 43.
Suffield (Conn.), 535.
Suffolk Cotton Manufacturing Company (Lowell), 546.
Sugar, area, 318; consumption, 491–492; duties, 20, 59, 60, 302, 303–305; exports, 305; general, 489–491; intercolonial trade, 114; maple, 489; ocean freights, 89; refining, 52, 59, 204, 205, 210, 218, 231, 394, 491–492; refining monopoly, 52; refining, wages, 394.
Sugar Act, 20, 59.
Sugar Islands, 93, 98, 131.
Sulphur, 112, 288, 333.
Sumner County (Tenn.), 342.
Sumter District (S. C.), 538.
Surinam Cotton, 319.
Surveyor-General, 14.
Susquehanna River (Pa.), 469.
Susquehanna Valley (Pa.), 338, 497, 499.
Sussex (England), 10.
Sweden, 138, 139, 156, 252, 298, 299–300.
Switzerland, 249–250.

Tallow, 301, 327, 492.
Tanning (see also *Leather*), association, 184; monopoly, 52; New York, 52, 209; process, 167; public in Virginia, 32; status of industry, 317, 495.
Tar (see also *Naval Stores*), bounties, 24, 36; Carolinas, 201; duty, 55; Florida, 210; Germans in New York, 42, 201; Massachusetts, 51, 65; monopolies, 51, 137, 165; New York, 199; ocean freights, 89; price, 137; process of manufacture, 165; Virginia, 11, 196, 201.
Tariff, American: advocated, 276–277; business conditions, 283–285; cotton manufactures, 309, 547, 550, 553; cotton mills in South, 541, 554; colonial, on exports, 55–56; colonial, on imports, 56–63; competition, 311–312; Confederation, 60–63, 229; crisis of 1783–1784, p. 229; currency, 285–286; duties, ad valorem, 274–275, 278, 282, 290; duties, credit for, 241; duties, specific, 61, 62, 271, 275, 278, 279, 298–299, 306–308; drawbacks, 21, 271, 301, 303, 304–305; early attitude toward, 268–270; European

after Napoleonic Wars, 243; free lists, 271, 280, 288; imports under, 384; investment in manufactures, 308; iron, 271, 275, 278, 279, 282, 296–300, 310; *law of 1789*, pp. 270–271, 288, 302, 303; *law of 1790*, p. 271; *law of 1791*, p. 302; *law of 1792*, p. 289; *law of 1794*, p. 304; *law of 1795*, p. 271; *law of 1804*, p. 288; *law of 1812*, pp. 272–273, 305; *law of 1813*, p. 296; *law of 1816*, pp. 274–275, 290, 293, 298, 304, 307; *law of 1818*, pp. 275, 298; *law of 1824*, pp. 246, 278, 286, 292, 293, 307, 309, 531; *law of 1828*, pp. 278–279, 286, 288, 289, 292, 293, 298, 302, 303, 307, 309, 310, 545; *law of 1832*, pp. 279, 280, 289, 298, 302; *law of 1833*, pp. 281, 285; *law of 1842*, pp. 282, 285, 286, 289, 292, 294, 298, 300, 301, 302, 303, 304, 305, 488, 571; *law of 1846*, pp. 245, 282, 285, 288, 289, 292, 294, 295, 298, 300, 301, 302, 381–382, 488, 553, 574; *law of 1857*, pp. 282–283, 289, 292, 295, 300, 301, 302; lobby for, 277; Madison's opinion, 306; market stability, 308; minimum valuations, 275, 278–279, 282, 306, 307–308; opposition, 277, 280–281; overproduction, 309; prices, 286–287; raw materials, 58–59, 62, 287–305; southern attitude, 276; sugar, 59, 274, 275, 278, 280, 282, 291–295, 488; uncertainties, 310; wool, 60, 275, 278, 282, 288, 290, 292, 567; woolen manufactures, 566–567, 571, 574.

British: American commodities, 554; colonial duties on British goods forbidden, 56, 58; colonial trade, 16–17, 19–21; cotton, 259; drawbacks on goods shipped to colonies, 21, 204; flour, 258–259; free trade with colonies, 16–17, 145; iron, 20; lumber, 20, 94; raw materials, 250, 259, 292–293; sugar, 20; West India imports, 257; wool, 250, 259, 292–293.

Tariffville (Conn.), 568.

Taunton (Mass.), axes, 513; calico-printing, 548; cotton-spinning, 544; iron-rolling, 514; locomotives, 509; machine-shops, 434, 520; nails, 441; power looms, 541.

Taunton Manufacturing Company (Mass.), 458.

Taxes, 45–47.

Technical Progress, 402.

Tennessee, cotton-mills, 342, 537, 542, 552; homespun, 439; iron, 342, 497, 499, 501; steam turbine, 410; textile machines, 519.

Tennessee River, 558.

Texas, 490, 498.

Textiles, see *Cotton, Flax, Hemp, Silk, Wool, etc.*

Thomas, Gabriel (historiam), 181, 197.

Thompsonville (Conn.), 568, 570.

Thorpe, John (inventor), 426.

Thrasher, Francis (cloth maker), 46.

Thread, 5.

Threshing Machines (see *Agricultural Implements*), 476, 478.

Thurber Cotton Mill (Providence), 379.

Thuringia, 400.

Tiles, 115, 166.

Timber (see *Lumber*), 73, 74, 75.

Tin, 112, 330; tinware, 523–529.

Tioga (N. Y.), 338.

Tiverton (R. I.), 375.

Tobacco (*Cigars*), 10, 16, 17, 19, 84, 107, 231, 318, 341, 399, 486–488.

Toll Laws, Maryland, 63–64; New Amsterdam 63; New England gristmills, 63; New Jersey, 63; Virginia, 64.

Toll Roads, 336.

Tolls, 342.

Tonnage Laws, 60.

Tools (see *Axes*, etc.), 204, 212, 522–523.

Tow Cloth (see *Flax Manufactures*), 141, 341.

Towns, 41.

Trade (see *Exports* and *Imports*), effect of wars, 133–134; foreign, 237, 255–256; free before 1651, p. 16; river, 344; unfavorable balance, 121, 258.

Trade Marks, 65, 66.

Tradesmen, see *Artisans*.

Transmission of Power, 411–412.

Transportation (see *Freights, Markets, Roads*), 350, 354.

Treaties, commercial with Great Britain in 1815, pp. 256, 257–258; Jay, 256; Reciprocity with Canada, 269, 361.

Tredegar Iron Works (Richmond), 514.

Tremont Cotton Manufacturing Company (Lowell), 546.

Trenton (N. J.), gristmills, 178; manufactures, 186; rolling mills, 514; sawmills, 177; steelworks, 171, 221; tannery, 168; wire rope, 518.

Troy (N. Y.), 466; car-wheels, 505; coaches, 475; rolling mills, 514; stoves, 504.

Truck System, 365.

Trusts and Combinations (see *Companies*), 184.

Tryon, William (Governor), 177, 209.

Turbine, Water-wheels, 262, 407–408, 416, 557.

Turkey Company (England), 4.

Turpentine (see Naval Stores), 137–138, 493.

Type, casting machinery, 417; Philadelphia, 231.

Ulster (Ireland), 157.

Ulster County (N. Y.), 514, 571.

Uniform Parts, see *Interchangeable Mechanism*.

Union Manufacturing Company (Baltimore), 374.

United Company of Philadelphia, 183, 190–191.

Uxbridge (Mass.), 565.

Vaucluse (S. C.), 556.

Vaucluse Cotton Company (S. C.), 459.

Vehicles, made in colonies, 212; manufacture, 474, 475–476; product in 1860, p. 479; standard parts, 474–475.

Vermont, copperas, 315; iron, 497, 498; prison manufactures, 379; scales, 517; stove plates, 503; woolen manufactures, 367.

Vincennes (Ind.), 542.

Virginia, air furnace, 171; apprentices, 67–68; artisans, 10–11, 196; brewing, 195; capital, 146, 152; carpets, 569; coal, 331; cotton, 83, 84, and note 5, 209; crises, 130–131; exports, brick, 98; exports, corn to Massachusetts, 113; exports, cotton, 84; exports, forbidden, 53; flax, 82 note 1, 195; flour, 317, 318; harvesters, 478; hats, 209; household manufactures, 195; imports, New England furni-

ture, 205; iron, 11, 171, 209, 385, 499, 514; iron trade, colonial, 97; iron-works, 146, 205, 219; labor, negro, 399; laws, 26, 31, 32; laws, bounty, 33, 34, 35, 36; laws, export, 53; laws, legal-tender, 44, 45, 126; laws, mill, 64; laws, monopoly, 50; laws, patent, 48; laws, premium, 37, 38; laws, subsidy, 39; laws, tariff, 58, 61; laws, tax, 46; laws, town, 68; lead, 295, 315; leather, 55; linen, 35, 37, 198; lumber, 94, 95, 468; manufactures, 197–198, 201, 205, 209, 211, 551; mills, 196; mulberry, 197; navigation acts, 18, 32, 36; petition and report upon manufactures, 197, 554, 555; population, 102, 105; pottery, 205; prices, cloth, 149; prices, cotton, 84; prices, wool, 80; public manufactures, 32; rolling-mills, 515; salt, 32, 315; sawmills, 176; sheep, 78; shipbuilding, 95; shoes, 32, 195, 209; Society for Encouraging Arts and Manufactures, 38; spinning rates, 387; spinning-schools, 67, 188; tanning, 32; tar, 11, 196; tariff, 58, 60–61; tobacco, 16, 107, 318; trade restricted, 12, 16; wages, 155, 157, 392, 396; wars, 133; weavers, 195; weaving account, 149; weaving rates, 388, 389; wine-making encouraged, 42; wool, 80; woolen-manufactures, 34, 217, 563.
Virginia Company, 4, 12.
Vulcan Iron Works (Philadelphia), 280–281.

Wages, American and Great Britain cotton mills, 390; American and Great Britain woolen mills, 390; Canada, 16; carpenters, 393; colonial compared with British, 155–157; depressed by paper money, 129; do not measure labor cost, 244; England, 156, 393, 394; England and Massachusetts, 389; England and the United States, 392; farmhands, 155–156, 392; glassworkers, 394; hatters, 394; included in profits, 372; industrial labor, 393–397; ironworkers, 393–394; mechanics, 393; New England, 136, 156, 395; New York, 156; papermakers, 394; Pennsylvania, 156, 393–394; road labor, 391; Russia, 299–300; Scotland, 157; ship carpenters, 208; shoemakers, 394–395; spinners, 395; South Carolina, 396; sugar refiners, 394; Sweden, 156; textile workers, 156–157, 387–389, 395–396; truck payment, 365; Ulster, 157; unskilled labor, 136, 391; Virginia, 155, 157, 392, 396; wage level not rising, 396; weavers, 395–396.
Wales, 7, 413.
Walker, Secretary R. J. (see *Tariff* of 1846).
Walker Report, 375, 377.
Waltham (Mass.), factory system, 450; labor system, 397; power loom, 428, 429, 540; spinning rates, 388; wages, cotton-mill, 395; wages, paid in cash, 365; watch manufacturing, 421, 454.
Waltham Company, see *Boston Manufacturing Company*.
Wampum, 124–125.
Wareing, John (spinner), 42.
Warren Cotton Manufacturing Company (Baltimore), 548.
Wars, 1812, and inland transportation, 336; *1812*, and investment, 367; Crimean, 246, 483; effect on currency, 134; effect on prices, 132; immigrant labor, 400; increase imports, 210–211; King William's, 133; manufacturing profits, 374, 376; Mexican, 285; Napoleonic, 272, 536; Queen Anne's, 133.
Warwick (R. I.), 535.
Washburn, Icabod (inventor), 518.
Washington Family (ironmakers), 147.
Washington, George, cloth manufacturing account, 149–150; plow, 476; Potomac navigation, 338; wages paid, 157.
Washington (Pa.), 339.
Washington County (Pa.), 537.
Washington Mills (N. J.), 559.
Watches, 420, 454.
Water-Power (see also *Lawrence*, *Lowell*, *Turbines*), cheaper than in England, 410; colonial, 174–175; cost per horse-power, 410; cost per spindle, 405; defined, 405; development, 403–408; influence on organization of cotton manufactures, 543; Lawrence, 405–506; Lowell, 404–405; Manayunk, 406; New Ipswich case, 406; Norwich, 544; Paterson, 404; water-wheels, improvements, 406–408.
Water-frame, 426.
Waterbury (Conn.), 222, 525, 526.
Waterford (Conn.), 570.
Waterman, John (cotton spinner), 367.
Watertown (Conn.), 521.
Watertown (Mass.), 41, 336, 494.
Watt, James, 8.
Weare, Comproller Peter, 213.
Weavers, 11, 32, 41, 208, 209.
Weaving (see *Cotton*, *Flax*, *Hemp*, *Silk*, *Wool*, and *Homespun Manufactures*), affects character of fabrics, 433–434; America and England, 430; colonial, 160; cost, 388–389; fly-shuttle, 428; looms, 428–430, 432–433, 434; Pittsburgh, 542; Virginia, 149, 195, 388, 389; wages in the United States and Great Britain, 156–157, 395.
Webster, Daniel, 299–300.
Webster (Mass.), 543.
Wedgewood, Josiah (porcelain manufacturer), 111.
Weeden, W. B., 28, 624.
Wentworth, John (Governor), 207, 210.
West Hartford (Conn.), 225.
West India Company, 47.
West Indies, British trade competition, 131; bullion, 125; commerce after Revolution, 228–229, 230, 254–257, 360; cotton, 77, 83, 85, 319, 357; declining market influence, 101; distilling, 303; duties on imports, 257; hides, 167; imports from America, 23, 99, 204, 212, 296, 301, 483; trade with colonies, 98–100.
West Jersey, see *New Jersey*.
Western Inland Company (N. Y.), 338.
Westminster (Mass.), 473.
West Point Foundry (N. Y.), 507, 508.
Western Railway of Massachusetts, 509
Wetherill, Samuel (woolen manufacturer), 190–191, 192, 225–226.
Whaling, 368.

Wheat, areas, 317–318; decline in New England, 103; exports, 237; price, 139, 143.
Wheeler and Wilson (sewing-machines), 521.
Wheeling (West Virginia), engine works, 506; nails, 516; rolling mills, 514.
Whigs, 11, 13.
Whisky (see *Distilling*), consumption, 480; price, 487; shipped via Potomac, 339; West, 318.
Whitestown (N. Y.), 549.
Whitin Machine Shops (Northbridge, Mass.), 520.
Whitney, Eli (inventor and manufacturer), belts, 411; cotton gin, 422; firearms, 517; interchangeable parts, 420.
Wightwick, John (iron-master), 173.
Wilkinson, David (machinemaker), 519.
Wilkinson, Samuel (machinemaker), 342.
Wilkes County (Ga.), 538.
Willimantic (Conn.), 544.
Willimantic Linen Company (Conn.), 532.
Williams, David R. (Governor), 493, note 2, 538, 542.
Williamsburgh (Va.), 42.
Wilmington (Del.), Arkwright mill, 535; bolting cloth, 575; car-wheels, 505; handlooms, 550; iron works profitable, 377; manufacturing town, 185; rolling mills, 513; woolen mills, 562, 563.
Wilmington (N. C.), 468.
Winchester (Ala.), 346.
Winchester (Va.), 75, 89.
Windham County (Conn.), 552.
Windmills, 174.
Windsor (Conn.), 90.
Wine Islands, 93, 99.
Wine-making, 36, 42, 481.
Winship, Jonathan (packer), 482.
Winslow, Samuel, 50.
Winthrop, John, crisis of 1640, p. 130; imports iron workers, 153; imports sheep, 78; iron works, 146; land grants, 40, 41; salt monopoly, 50.
Wire, free list, 288; general, 518; iron, made in Connecticut, 296; nails, 518; piano, 518; Pittsburgh, 409; rope, 518.
Wisconsin, 328, 467, 498.
Woodbridge (N. J.), 41, 42, 216–217.
Wooden-ware, 114.
Wool, Boston sales, 359; bur machine, 324, 422; Canadian, 295, 324; carpet, 466; combing, 80, 195; consumption, 324–425, 569; cost, in United States and Great Britain, 80, 292–293; Delaware, 80; grades, 291, 321; export forbidden, 54, 55; exports, 80, 81, 294, 323, 324; grazing districts, 78, 322–323; Iceland, 321, 561; imports, American, 77, 81, 100, 250, 290, 295, 321, 322, 323, 324, 561, 566; imports, British, 81, 250; legal-tender, 45; Merino, 315, 321–322, 561, 562, 563; New England, 321; prices, 80, 81, 141–142, 292–293; product, 325; quality, 80–81; Rhode Island, 80; Saxon, 322; scarcity, 320–321; sheep, 77–79, 195, 202, 207, 216, 226, 315, 320–323, 561, 563; Smyrna, 566, Spanish, 77, 81, 100, 250, 321, 324; supply, 77–82, 211; tariff, American, 60, 275, 278, 282, 288, 290, 292, 567; tariff, British, 250, 259, 292–293; trade, 23, 79–80, 81, 117; Virginia, 80; wool rents, 226.
Woolen Manufactures (see *Worsteds*), blankets; 563, 568; Boston, 190, 197; bounties, 34–35; brewster, 425, 428; broadcloths, 109, 140, 208 and note, 216, 429, 433, 434, 563, 565, 566, 567, 568, 570, 572; Canadian market, 294; capital, 369–370, 373, 377, 562; carded fabrics more common than worsteds, 160; carding and fulling in West, 341; carding machinery, 423; carpets, 429–430, 466, 568–569, 570; cassimeres, 429, 434, 564, 565, 568, 570; cassinets, 570–571; census of 1810, p. 253; Cincinnati, 346, 563; combing machinery, 423–424; competition, British, 250, 293; Connecticut, 44, 198, 225, 429, 432, 562–563, 567, 568; crises, 379, 381, 382; druggets, 109, 200; duffles, 109; dyeing, 160, 432; exports, British, 11, 21; felts, 430, 573–574; finishing machinery, 432; flannels, 109, 200, 376, 564–565, 567, 568, 570, 574; Georgia plains, 433; Goulding Condenser, 423, 434, 565; Hartford Woolen Manufactory Company, 44, 366, 373, 387, 388, 395, 423, 425, 448, 560, 561, 572; homespuns, sale forbidden, 15; imports, 109–110, 132, 246, 247, 248, 250, 251, 253, 362; inspection, 66; intercolonial trade, 116–117; Irish prohibited, 15; jacks, 425, 428; jeans, 570, 571; jennies, 190, 192, 424–425, 561, 565; Kentucky, 567; kerseys, 109, 140, 200, 568; later development than cotton manufactures, 560–561; linseys, linsey woolsey, 109, 141, 196, note 1, 198, 200, 209, 570, 574; Long Island, 198; looms, 429, 434, 565, 569, 570, 574; losses, 373, 567, 568; Maine, 376, 377; Maryland, 567; Massachusetts, 196, note 1, 197, 199, 566–567, 567–568, 569, 571, 574; mechanical transition, 434; mills, 346, 432, 562, 563, 567; mills, early, 561–562; mills, size, 452–453, 570; minimum valuations, 293–294; mixed warps, 433; Mount Vernon, 149–150; mules, 427–428; negro cloth, 110, 294, 433, 566, 568, 570, 571, 574; negro operatives, 399; New Hampshire, 203, 561, 567; New Jersey, 197, 216, 226, 567; New York, 198–199, 208–209, 563, 566, 567, 568, 574; nonimportation, 216–217; Ohio, 563, 574; organization, 357, 449, 453, 574; Pennsylvania, 197, 563, 567, 568, 574; Philadelphia, 183, 188, 191, 225–226, 231, 562, 567, 568, 574; Pittsburgh, 409, 563; power machinery, 565; prices, 100, note 5, 140–142, 225, 294; prints, 432; product, 213, 562; profits, 376–377; prosperity, 309; Rhode Island, 208, note, 567, 568, 569; Rowley, 153; sales, 358–359; satinets, 376, 377, 564, 567, 568, 569–570; Scholfields, 446; shawls, 573; shoddy, 433, 571; South Carolina, 191, 568; spinning costs, 387; steam-power, 409, 410; statistics of mills and machinery, 565, 567, 569, 570, 571, 574; strouds, 100, note 5, 109; stuffs, 200; tariff, 59, 274, 275, 278, 280, 282, 291–

295, 566–567, 571, 574; Vermont, 567; vicissitudes between 1820 and 1830, 566–567; Virginia, 217, 563; Virginia cloth, 110; wages, 390; weaving costs, 388; yarn, prices, 141–142.
Woonsocket (R. I.), 543.
Woonsocket River (Mass.), 404, note 2.
Worcester (Mass.), car-wheels, 505; cotton mills, 192, 533; cutlery, 523; early manufacturing center, 89; iron-rolling, 514; machine-shops, 434, 466; textile machinery, 519, 520; tools, 523; town lots, 41; vehicles, 475, 476; wire, 518.
Worcester County (Mass.), axes, 522; broadcloths, 568, 572; plow-making, 477; scythe and saw makers petition for duty, 297; textile machinery, 520; wire, 518.
Worsteds, 46, 141–142, 160, 163, 190, 324, 423–424, 572–573; alpacas, 573; cashmeres, 573; hose, 142–143; Massachusetts, 196, note 1, 197, 200, 573; mousseline-de-laine, 573; not made in United States, 250; Philadelphia, 187, 573; Rhode Island, 208, note, 573; serges, 46, 109, 140, 147, 197, 198, 200, 564; yarn, prices, 141, 142, 572–573.
Wrentham (Mass.), 534, 535.

Yarmouth (Mass.), 530.
Yarn (see *Cotton*, *Flax*, *Hemp*, *Wool*), change in center of production, 447; cotton, 346, 541, 543, 558, 559, 560; guild regulations, 434; mixed cotton and woolen, 433; prejudice against water spun, 434; price, 386; woolen prices, 141–142; worsted, 141, 142, 572–573.
York (Pa.), 469, 508.
York Manufacturing Company (Saco, Me.), 376.
Yorkshire, 153, 273.
Young, Arthur, 157.

Zinc, 328, 414, footnote.